BT Barn Book

BT STANDS FOR BIG T

Book No. 31

Beatty Bros. Limited Fergus, Ont.
Winnipeg, Man. Montreal, Que.
Edmonton, Alta. St. John, N.B.

INDEX

Building the Barn

Building the Barn

The best results can be obtained from modern sanitary equipment only when the principles of "sanitation" are followed in the construction of the building. Foundations, gutters, floors and drains must be built right, stables must be well lighted and properly ventilated.

Steel Stalls keep the cows clean, comfortable and contented, so that they give more milk and better milk. Yet, not even the steel can overcome the disadvantages of a stable where there is little light and no ventilation.

Nor is sanitation the only important thought. The BT Equipment saves a lot of hard work. But if your barn is not laid out well, and not handy for feeding and cleaning, you will have to take hundreds of needless steps every day that even the Steel Stalls cannot prevent.

There are a great many things to be planned for. Location, design, size, appearance, framing, siding, doors and windows, and roofing all have a part in making the barn worthy of the farm, or in spoiling it so that it detracts from the value of the whole property.

The astonishing thing is that it costs no more to build a barn in which all these features are right than to have them all wrong. All that is required is the patience and the time to investigate. The man who will plan his barn, and get the whole thing put down on paper, usually discovers ways of saving money that pay him for his trouble a hundred times.

Barn construction has made great strides in recent years. There are many improvements which every farmer should be familiar with before he builds or remodels his barns.

These facts have caused us to take a very broad interest in barn construction extending beyond the fitting up of the stables. We established a barn plan department years ago to help our customers in these matters.

On page 322 we tell you about the service that this department offers without charge to any man who is building or remodelling a barn.

Let us simply say in this introduction that, as a part of our business, we have to plan and design many hundred barns every year, and the plans for many others come before us for advice so that we have accumulated a store of valuable data We are in touch with every practical development of the subject of barn construction. We designed and furnished complete plans for many of the barns illustrated in this book, notably the barn of Mr. Gordon Gooderham, pages 280 1.

You may benefit from our wide experience even before you purchase BT Equipment. Let us say that scarcely more than the essential principles have been dealt with. Conditions vary so greatly in different provinces that no detailed rules could be given. In our Western Provinces, winters are extremely severe, while along the Pacific coast they are quite mild. In some sections cement is the most economical material for foundations.

In other parts it is better to use stone. Yet, the general principles apply everywhere and we are sure that if they are followed, you will have a more serviceable building at less cost.

These ideas were followed in building the many fine barns shown in this book. Study the ideas. Study the barns. Then avail yourself of the free service we offer on page 322.

Let us take this opportunity of thanking the following gentlemen for the practical ideas and the inspiration they have given us from time to time: Dr. Rutherford, of the C. P. R. Dept. of Natural Resources, Calgary; Prof. J. H. Grisdale, director of Experimental Farms, Ottawa; Mr. E. S. Archibald, Dominion Animal Husbandman; Prof. G. E. Day, of the Ontario Agricultural College; H. A. Craig, Deputy Minister of Agriculture for the Province of Alberta. We must also thank the James Manufacturing Company of Fort Atkinson, Wisconsin, whose efforts have advanced the cause of sanitary stable construction in no small measure.

Site

Don't make any plans for your barn until you know where you are going to build it.

Avail yourself of the shelter of hills, trees, hedges and buildings which will act as windbreaks.

Have all your buildings grouped in as compact an arrangement as possible to save steps in looking after the stock. The new barn should be handy to the house and easily accessible from the fields. Run the barn North and South, so the strong, direct sunlight from the East and from the West can flood through the row of windows along both sides. The barn will be warmest when arranged this way, because the wind from the north will strike the ends.

The Barnyard should be in the sun on the south or south-west. Driveways will therefore be at the east or west.

The barn should be located high enough to permit it to be well drained. A clean yard is very desirable for the sake of the health and cleanliness of the cows. Many farmers have concrete yards. Others fill yards with 6 inches of broken stone covered by a layer of cinders.

Appearance

A prospective buyer can be more easily influenced to pay a handsome price for a farm by a well designed, fine appearing, practical barn.

The appearance of the barn can be made to have a big cash value and should be thought of in the planning. It is not a costly matter to make a barn beautiful. Put dormer windows in the roof, add a cornice and a cupola. They pay well.

Paint the barn. It gives your farm the appearance of prosperity, and adds to the life of the building.

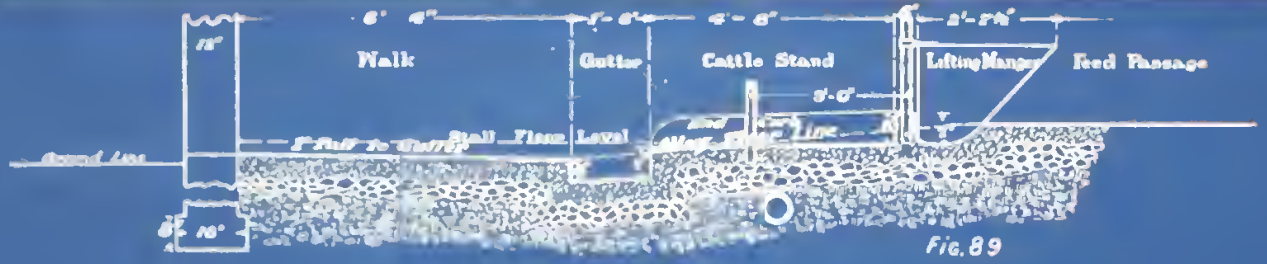


Fig. 89

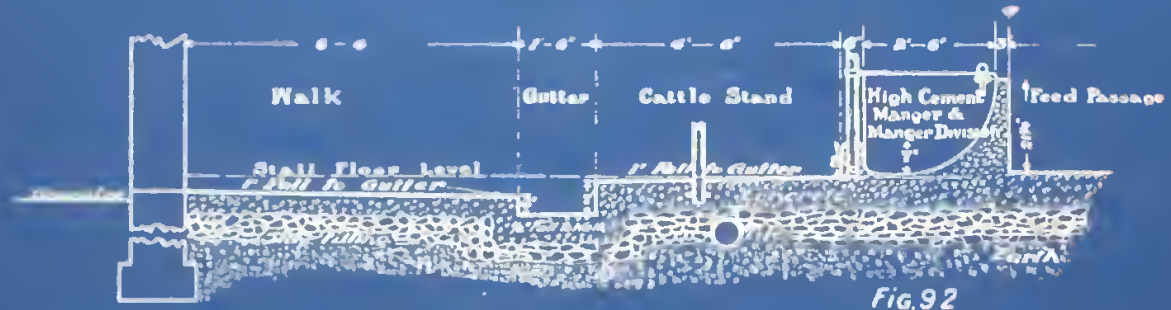


Fig. 92

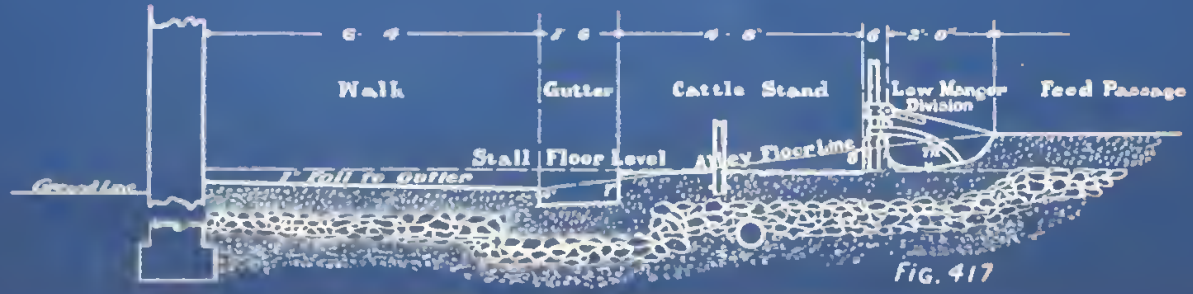


Fig. 417

GETTING THE FLOOR LEVELS

Design

There are several distinct types of barns and some things to be said in favor of all of them. There are rectangular square and round barns. The first of these has gained great favor in recent years.

You will note that almost all the barns in the BT Barn Book are of this type, or consist of one or more rectangles built together to form a T or an L. Cows are arranged in two rows running the full length of the barn Sometimes there are three rows, a row of pens running along one wall These rectangular barns are seldom more than 30 feet wide

There is not as much floor space available in them in proportion to wall space, as in the old fashioned square barns, but there are other considerations which make them preferable They are better lighted, even the centre being flooded with sunlight They can be ventilated more effectively The two row arrangement is handier for feeding, cleaning tying up the cows and other stable work Not one inch of floor space is wasted less space being required for passages than in the square barn Rectangular barns are very neat in appearance They can be framed more economically than a wide, square barn.

The plan of building a one storey dairy barn when there is a big barn available for storing feed is rapidly becoming popular in this country There is no objection to the two storey barn As root cellar floors also and most of the items of expense are practically the same it usually thought well to go the expense of second storey walls and have feed stored overhead

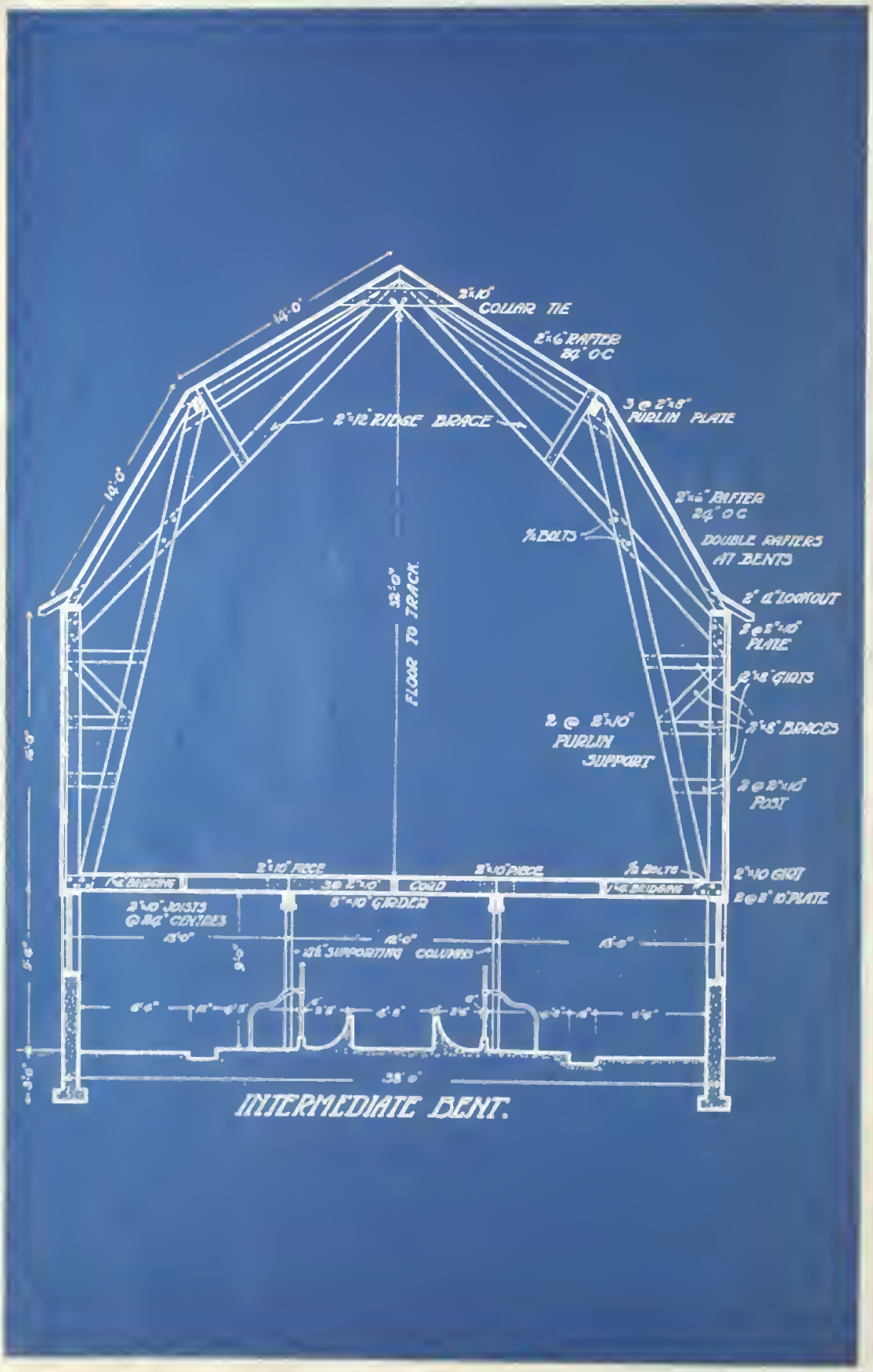
The stable is warmer with a loft above, and tight bedding prevents dust sifting through Chutes can be built in the two storey barn to save time handling feed and bedding

Size

This varies on every farm It depends upon the size of the farm, the kind of farming carried on, kind and number of head of stock now on it crops and plans for the expansion of the farm or the herd in the future

Always plan the barn so that stock sizes of lumber for joists, sheeting rafters, braces, windows and doors can be used

The barn should be built so that it lends itself readily to extension If a barn is properly planned it is an easy matter to increase the size as the stock increases or as more land is brought under cultivation Such a barn can be built in sections nearly as cheaply as if all were put up at the one time This point is especially important to our Western farmers who feel that they want to make a right start but cannot afford a big barn It is better to build a small barn properly and add to it as the place grows than to build a big place in which the cows are so poorly housed that they cannot pay a profit


14'-0"
2"x10" COLLAR TIE
2"x6" RAFTER 24" OC
3 @ 2"x8" PURLIN PLATE
2"x12" RIDGE BRACE
14'-0"
2"x6" RAFTER 24" OC
DOUBLE RAFTERS AT BENTS
⅞ BOLTS
2" d" LOOKOUT
3 @ 2"x10" PLATE
2"x8" GIRTS
2 @ 2"x10" PURLIN SUPPORT
2"x8" BRACES
3 @ 2"x10" POST
FLOOR TO TRACK
32'-0"
2"x10" PLATE
2"x10" JOISTS @ 24" CENTERS
8"x10" GIRDER
12" SUPPORTING COLUMNS
2"x10" GIRT
3 @ 8" 10" PLATE
35'-0"
INTERMEDIATE BENT.

Experience has shown that certain measurements for passages, stalls, mangers, curbs, gutters, and cattle stands are most practical. With these in mind, as well as the requirements mentioned above, it is not difficult to determine upon the right size.

Foundations

Good drainage is one of the first requisites of floor foundations. If the barn is in a low place, make a filling so that the stable floor will be 6 or 8 inches above the surrounding ground. If the barn is standing on heavy clay soil, and if it is not practical to get a fill of loose stones or gravel place drains under the flooring so that it will be kept dry. As on page 276, run the drain in a straight line underneath the whole length of the cattle stand. If the cement floor, where the cows stand, is properly under drained so that it will be dry, there is never any danger of injury to the cows' udders from lying on the cement.

In making floor foundations, remember that the passage way behind cattle stands will be level with the sills of the doors, as this passage must be used by the cows entering the barn to be tied in their stalls. Blue print on page 276 shows comparative heights of feed passage ways and cattle stands, for different types of mangers. The level of the walk behind cattle stands is the same in every case. It is important to follow the figures given in getting proper drainage for mangers and gutters, and proper grades for floors.

For wall foundations, nothing can equal concrete. Their size varies with the size of the barn. Some people claim that the foundations should go down below the frost line. This is not necessary, especially in the dry climate of our prairie provinces. Go down until you get a firm bottom and if the ground is damp, or if you are dealing with clay soil, put in a tile drain beneath the wall. Wall foundations should come up at least 6 inches above the floor line and stout bolts must be embedded in the concrete to secure the frame of the stable if it is desired to have wood walls. In this way, the danger of bottom of wood construction rotting will be avoided. For a large barn, with loft above, the base or footing should not be less than 18 inches thick and may taper up to a thickness of 1 foot at the surface of the ground. For one storey barns a footing 15 inches wide is sufficient and it may taper to a thickness of 8 inches at top.

Proportions of cement for wall foundations are 1 of cement, 3 of coarse, sharp sand, and 6 of clean, coarse gravel.

If cement is not available, stone makes a good foundation, but it should be made thicker than concrete.

Framing the Barn

To build the old-style heavy timber frame for a barn is a difficult and expensive proposition. Great skill and much experience is required to cut the mortise and tenon joints. Competent framers are difficult to get. The

BARN OF GORDON GOODERHAM
CLARKSON, ONTARIO

heavy timbers needed are scarce and costly. A frame such as that shown on page 291 was very well suited to the requirements of our grandfathers, when timber was abundant and labor cheap, but modern needs demand something more economical.

The Plank Frame Barn illustrated in these pages is built entirely of planks no more than 2 inches in thickness, and from 4 to 12 inches in width. Girders, trusses, purlines, and tie plates are all made up of these. If the right method of construction is followed, it can be made quite as strong as a heavy timber frame. Indeed, it is a safer frame when we consider that defects in the timber are much more evenly distributed and the uprights are not weakened by joints. If properly constructed of planks, they retain the strength of the whole timber.

What is generally known as the "hip roof" is always used with the plank frame. It gives a great amount of storage space in the loft. The center is open allowing the hay carrier to work to better advantage. Where there are no interfering cross beams, the hay can be run into the mow at just sufficient elevation to clear the hay already there. There is less labor required both in putting in and taking out the hay.

The old time "framing bees" become a thing of the past when the plank frame is built. No special skill is required to make the bents. The blue prints show details of construction better than we can describe them. Sizes of lumber are marked and joints at plate and purlin are shown.

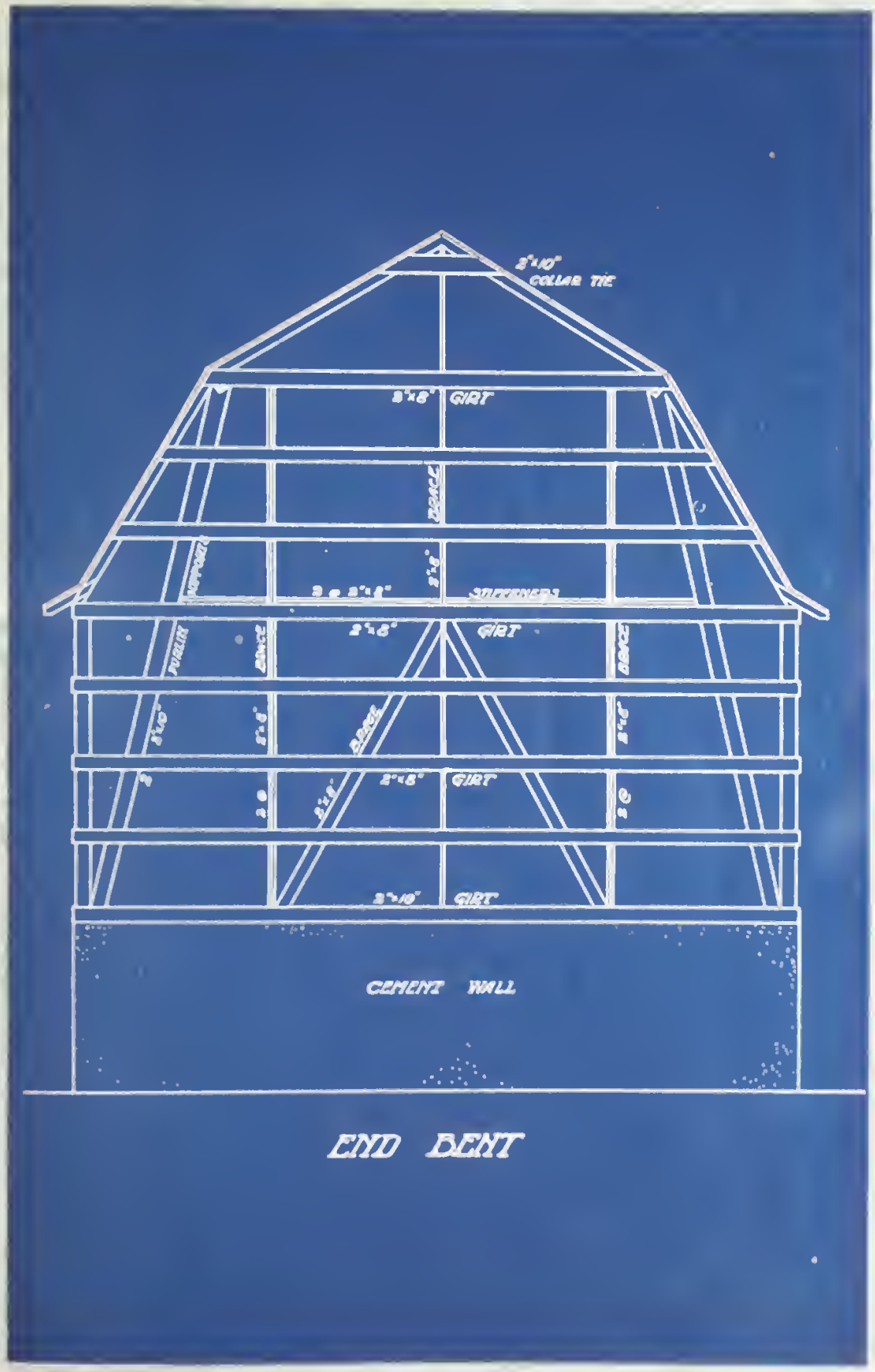
Wide Barn Frame, Circle Roof, Heavy Timber Frame, Steel Truss Frame

In a wide barn at least two hay tracks should be used. Page 290 illustrates the framing for such a building. There is no interfering construction between the first and second run of purlin plates and posts.

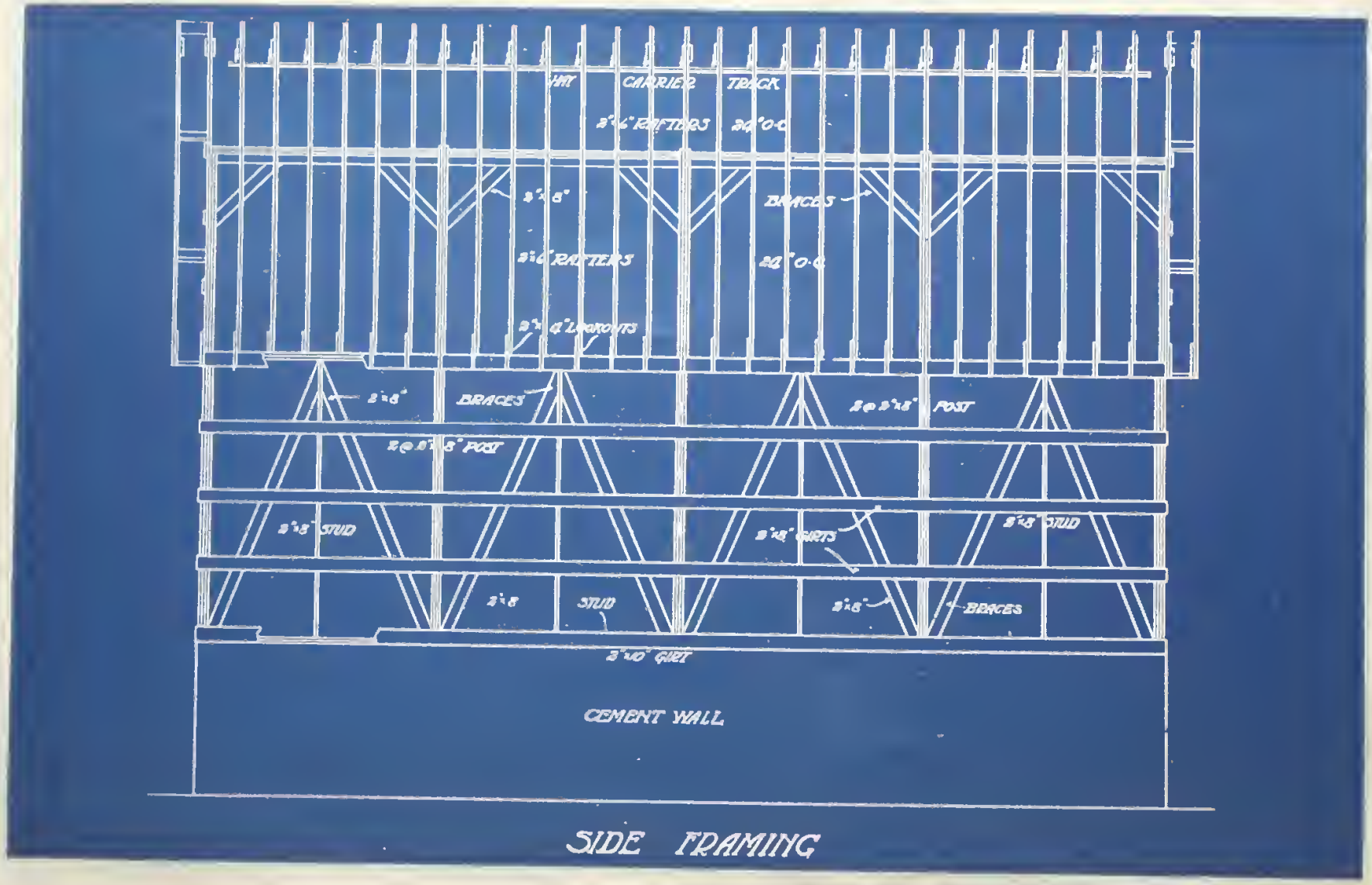
Framing for Circle roof is also shown on page 290.

A plan for a heavy timber frame barn appears on page 291.

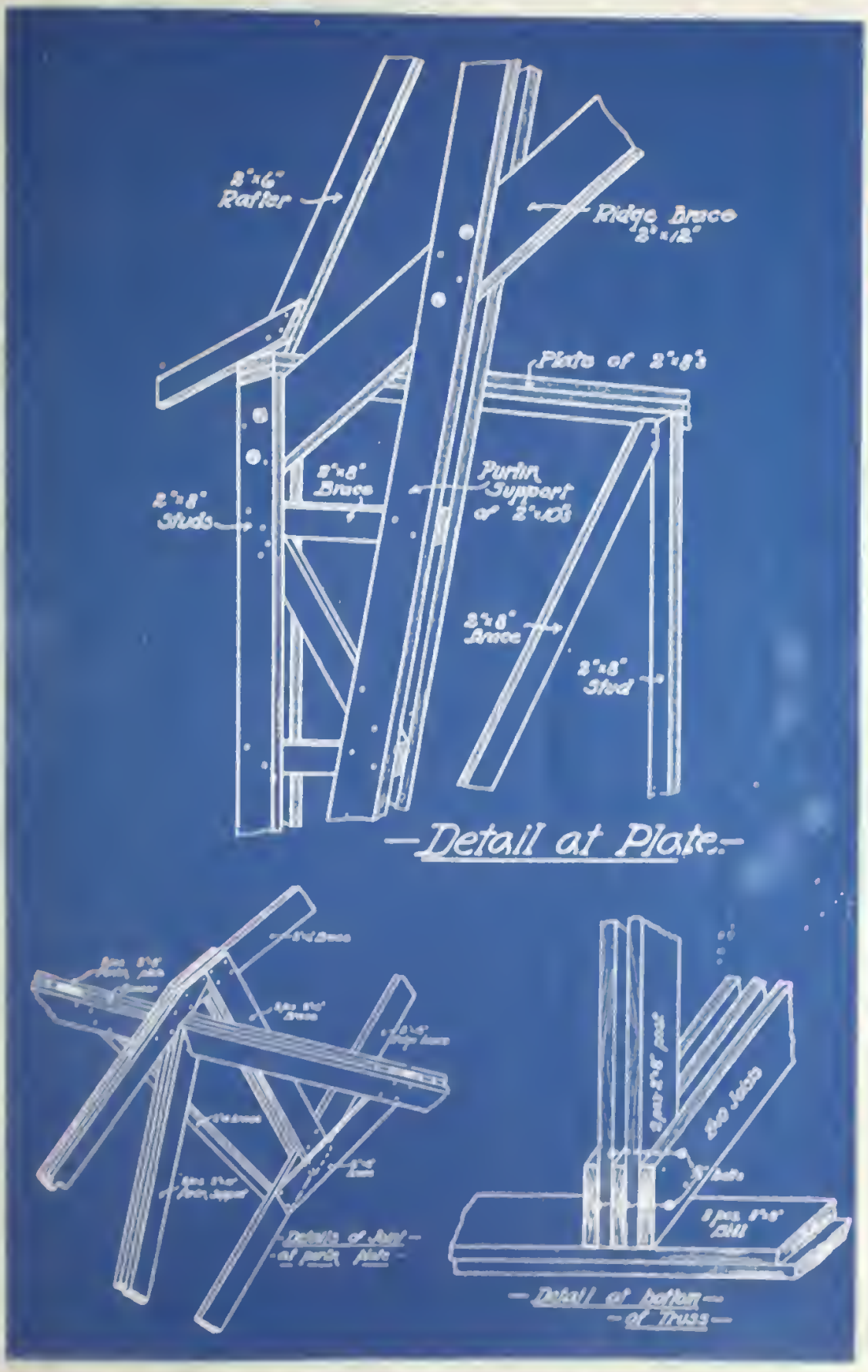
The popular Steel Truss Frame is shown on page 292.


2"x10"
COLLAR TIE
3"x8" GIRT
BRACE
SUPPORT
3"x8"
3 @ 3"x8" SPACERS
2"x8" GIRT
PURLIN
BRACE
BRACE
BRACE
2"x8" GIRT
3"x10" GIRT
CEMENT WALL

END BENT



SIDE FRAMING


2"x6" Rafter
Ridge Brace 2"x12"
Plate of 2"x8"s
2"x8" Studs
2"x8" Brace
Purlin Support of 2"x10"s
2"x8" Brace
2"x8" Stud
—Detail at Plate.—
—Details of Joint— —at ridge Plate—
—Detail of bottom— —of Truss—

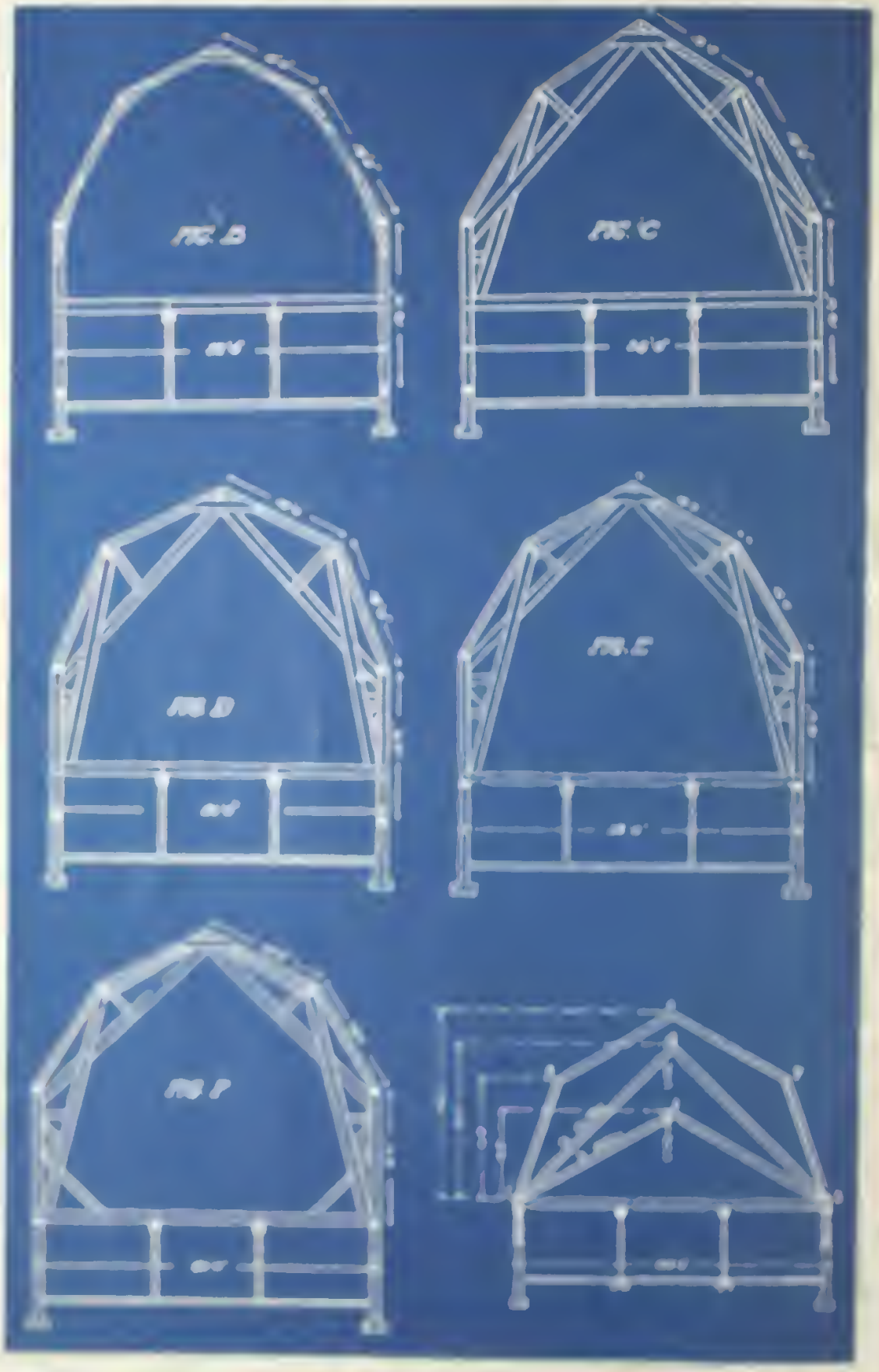


FIG. B
FIG. C
FIG. D
FIG. E
FIG. F

Roof Pitches

On the page opposite there is an illustration of the different types of roof pitches. We recommend the "hip roof" denoted by figures 1-5-6-7-3. Observe that it allows 24 feet of mow space, while the other styles only give 20 feet and 12 feet. The style 1-4-3 is very common to-day, but 1-2-3 has gone out of use almost entirely.

The advantage of this roof for storage space and appearance have been mentioned. If a horse fork is being used, it must register in the car at the top of the barn with its bundle, which requires more room than given by the roof 1-4-3. The greater part of the hip-roof has a very steep slope so that water runs off quickly and does not get the chance to rot the shingles given by the other two.

Also observe the framing for different widths on the opposite page.

Cheaper Plank Frame Construction

The next two pages, 288, 289, illustrate a style of framing which is some what less costly than even the plank frame construction shown on pages 278, 283, 284 and described on page 279. It is a satisfactory structure to be used in barns not over 36 feet wide.

As with the other method of framing, 2 inch planks is used entirely. Frame is bolted to sills as before and studding is spaced two feet so that stock sizes of materials can be used without much waste.

The difference between the two methods of framing is apparent upon com parison. The first method requires the construction of well braced trusses tied together by lower "cords" and spaced every 12 or 14 feet. Between these, and running across the barn parallel to them at intervals of 2 feet are the joists. The joists rest on the beams and the walls. Both joists and cords are made up of three lengths of plank.

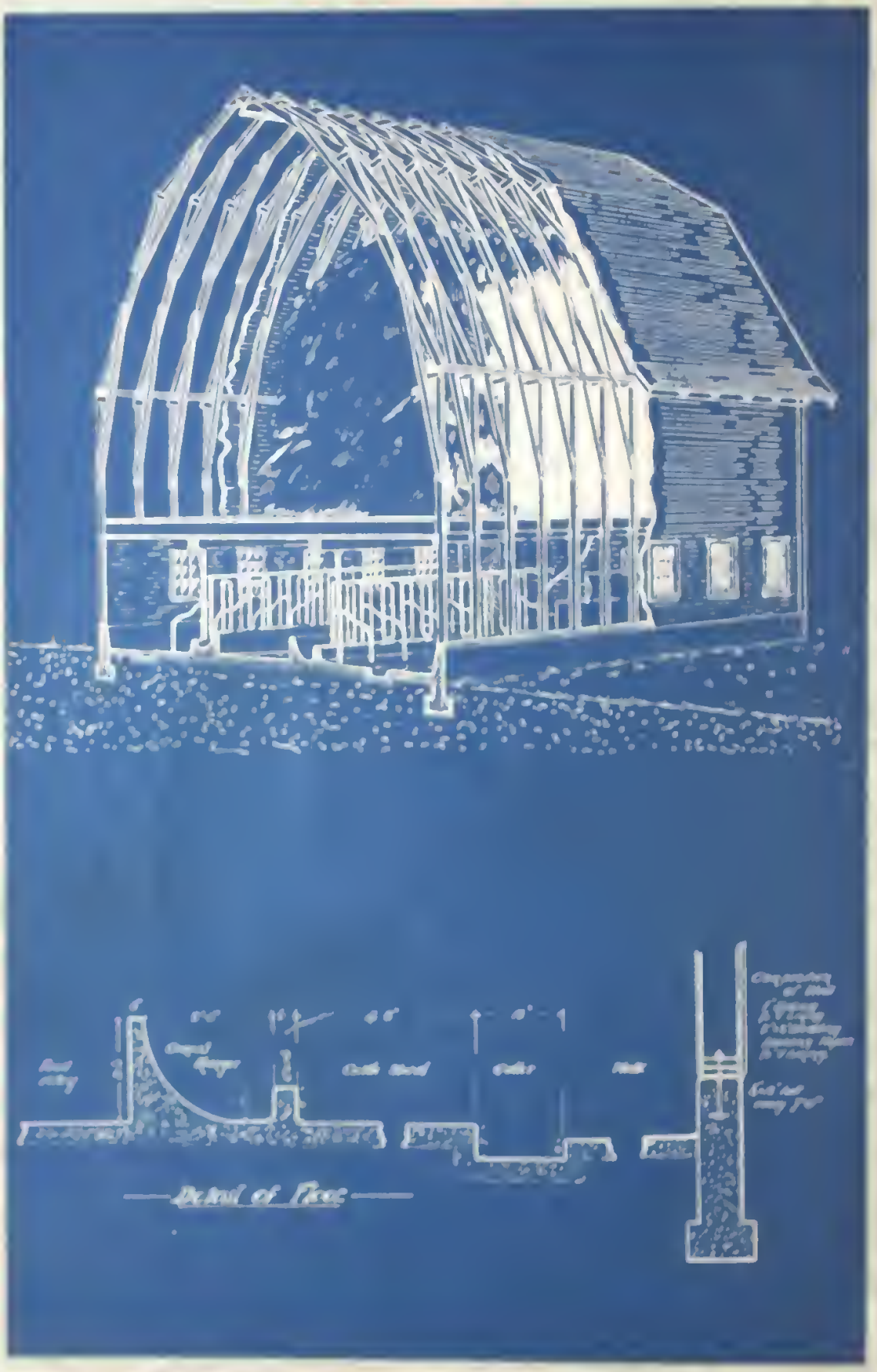
The latter method requires the bracing of each rafter, the rafters and stud-ding thus forming a truss every two feet. There are no lower cords, but every joist is spiked to the studding to tie the building together. The joists rest on the beams in the barn and each end on a ledger or ribbon which runs along the studding the full length, studding being notched an inch to hold ribbons more firmly.

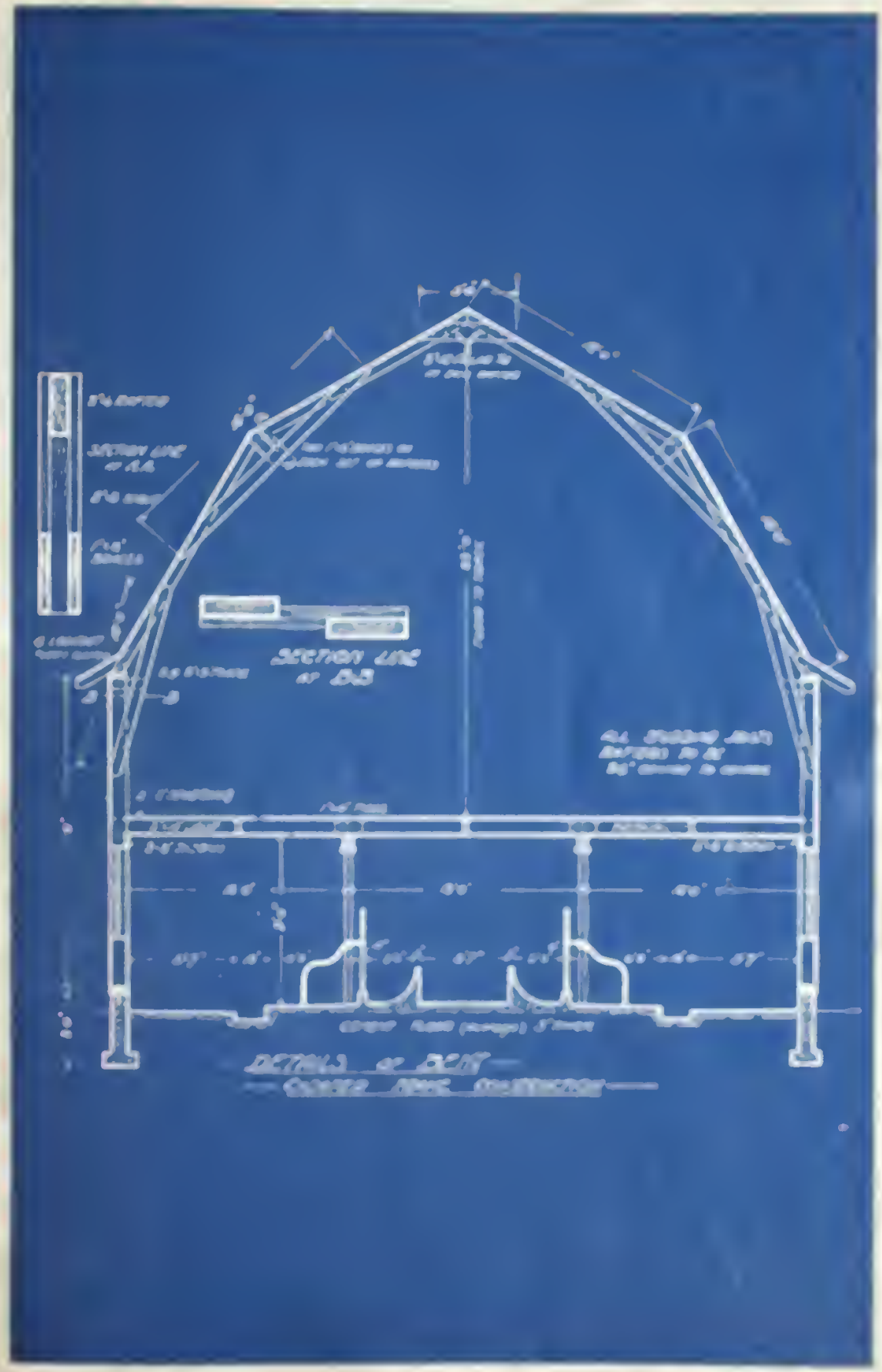
In construction of joists or any other part where a double thickness of plank is required, joints must always be broken.

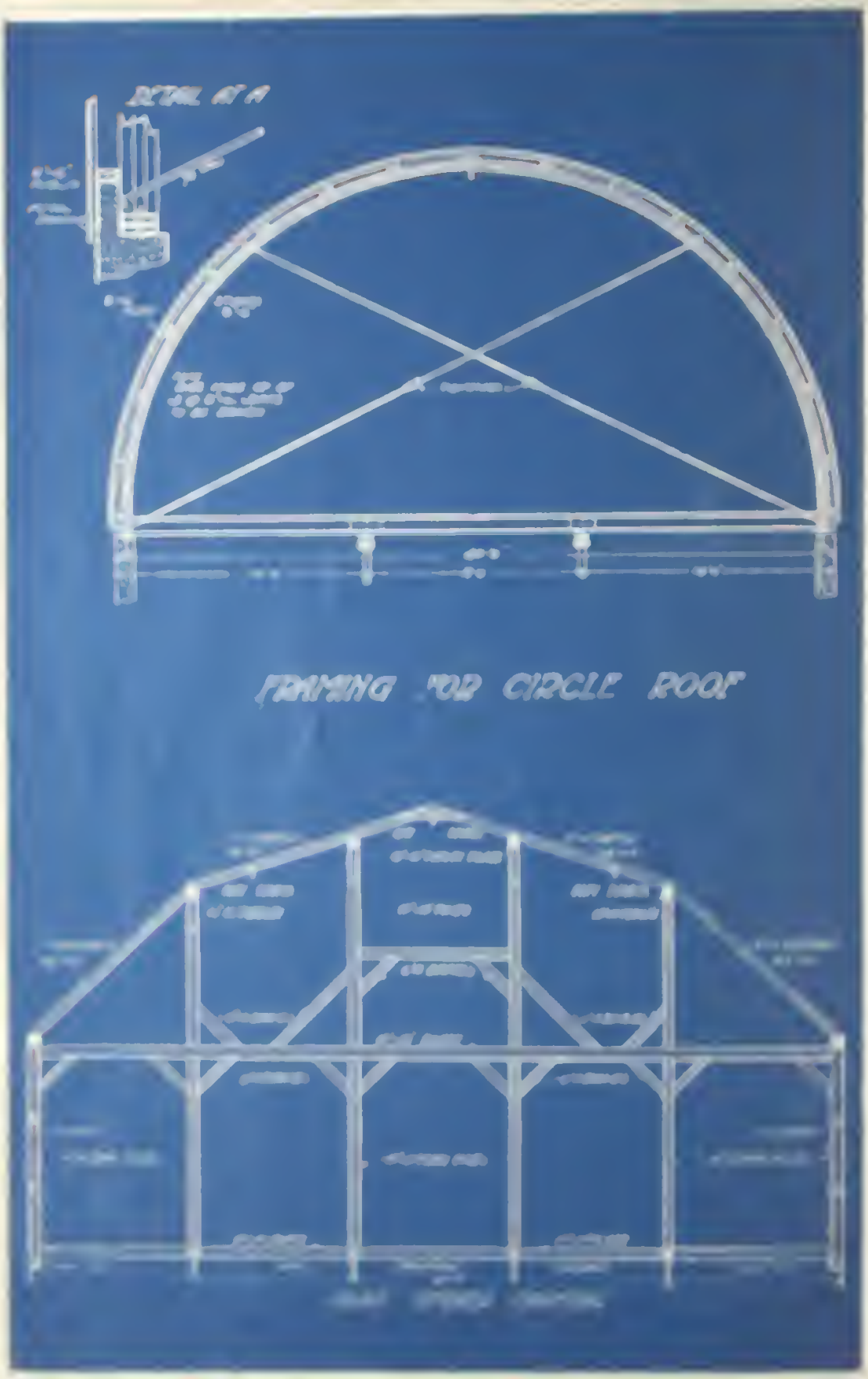
The cheaper frame construction requires 100 feet less of lumber than the other method for every 16 foot length of barn. This includes every truss and every 16 feet of studding and other framing it carries.

The Roof

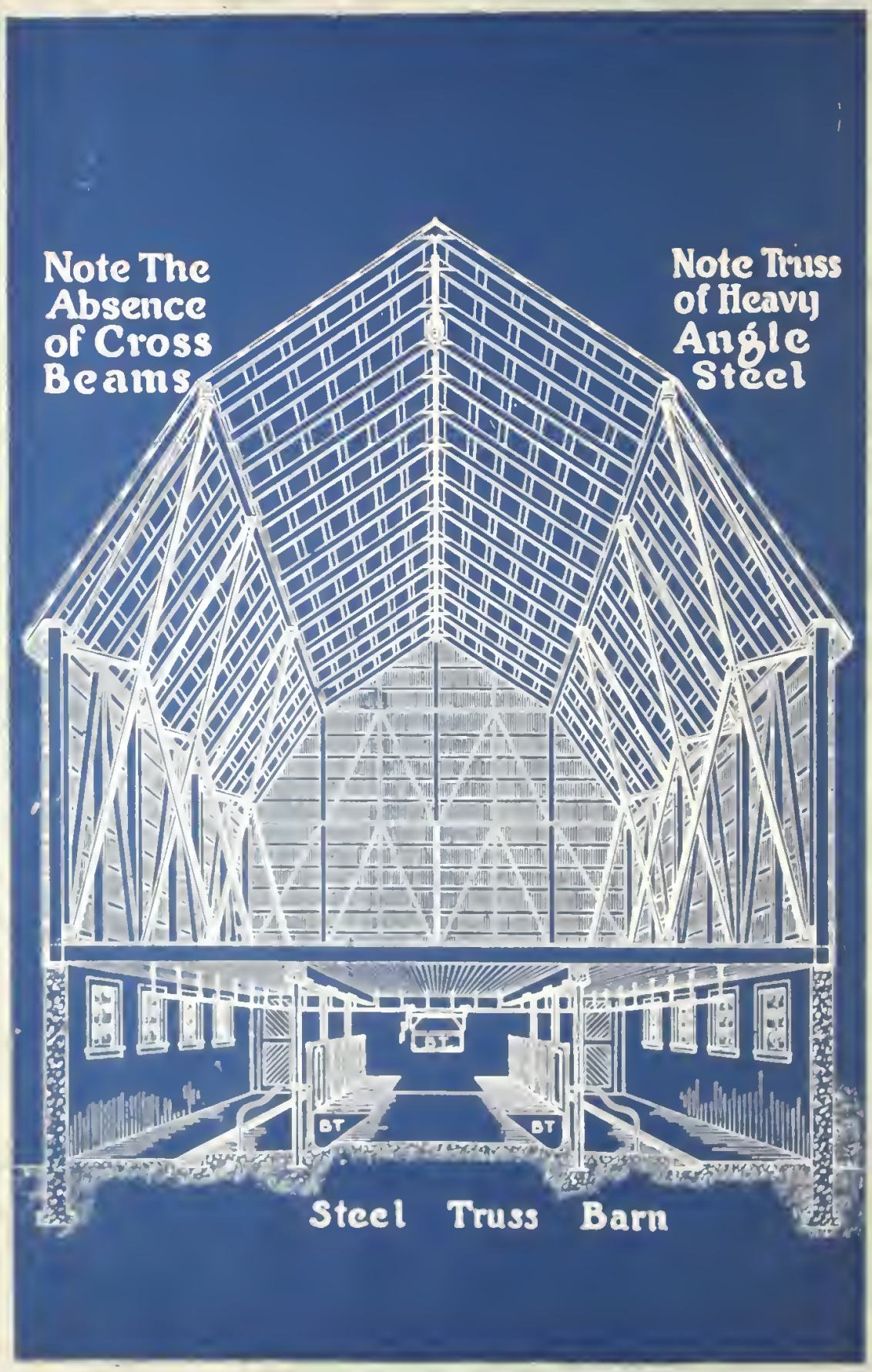
For roofing, shingles are cool and are easy to get in many parts of the country. They are not, however, as durable as a good galvanized roof, which has the further advantage of protecting the barn from lightning


Detail of Floor


SECTION LINE
AT D-D


FRAMING FOR CIRCLE ROOF

HEAVY TIMBER FRAME


Note The Absence of Cross Beams
Note Truss of Heavy Angle Steel
BT
BT
Steel Truss Barn

To Measure a Loft

Allow 500 cubic feet per ton of hay.

Size of Drive

14-foot drives are recommended, with two 7 feet 3 inch roller doors, 12 feet high. The drive floor occupies the full space between bents, so may be 12, 14 or 16 feet as desired. Double drives are sometimes used in very long barns. In a dairy barn, the drives should be as few and as small as possible, for they obstruct light.

Gable Doors for Hay Track

These should not be less than 12 feet deep to give plenty of head room for car with slings. There are two doors, each 5 feet wide. A 10 feet x 8 feet door will do for a horse fork.

Erecting a Plank Frame Barn

After the foundation is in and the frame for the first storey wall complete, the supporting columns are put in place, the proper footings for same having been provided. It is important that the footings be of ample size; if they are not, the building may settle, cracking the concrete floor and doing other damage.

We recommend metal columns, and when they are used the bottom of the column should be two to six inches below the finished floor line, depending upon the method of finishing the floor.

When these columns are in place and the concrete set, the girders may be laid.

The floor joists are next put in, and a temporary floor laid on them so that the workmen can move about freely while raising the trusses.

Cut and put together the first truss according to plan as on page 276. When this first truss is completed, lay it on the floor and build the other trusses on top of it, to insure absolute accuracy in all joints and measurements.

When all the trusses have been finished, the first truss is placed in position at the end of the barn.

This is usually done by placing the feet of the truss at the place where they are to rest when in position, with the top of the truss towards the center of the barn. Blocks are then spiked to the joists at the proper points so as to keep the feet of the truss in place while being raised; the feet of the truss rest against these blocks and pivot on them.

A gin pole is erected at the end of the barn in the center, leaning at an angle of about 45 degrees toward the center of the barn; a block and tackle is rigged, the rope passing over a gin pole and attached to the upper parts of the truss.

A horse or team is hitched to the block and tackle, and the truss quickly raised to position. A few men with guy ropes are necessary to steady the truss while being raised.

As soon as the first truss is up, it is braced in position.

The second truss is raised in like manner, and as soon as it is up the girts are added, as shown on the opposite page.

Then one after the other the trusses are put in place, the girts being spiked on as you go along. The last two trusses, when laid in position for raising, will project over the end of the barn. The projecting portion is supported by temporary props, which are removed when the truss is being raised. The end girts can be added at any time convenient.

To put on the plates, no scaffolding is needed, since it is not difficult to climb on the truss itself.

The next step is to put the purlines in place, and raise to position with block and tackle.

Before putting on the rafters and cornice the siding is nailed on, because it can be done more conveniently before the rafters and the roof boards are in place, there being nothing to interfere with nailing on the boards under the cornice.

Ceilings

When there is a loft overhead, stables should be ceiled perfectly tight so no dust can get through. Close fitting, tongued and grooved stock should be used, protected by a layer of building paper just between lumber and joists. Sometimes metal siding has been used for the ceiling, but all that is needed is a plain, smooth surface that will not catch dust, harbor lice or collect cob webs. Some people simply nail up a few wide boards for the purpose, but these shrink, leaving big gaps through which the dust falls.

Both ceilings and walls should be painted white or whitewashed, as the intensity of the light in the stable can be doubled in this way.

The height of ceiling varies with the width of the barn and the climate of the locality. It should never be too high, or it will be difficult to keep up sufficient air current for effective ventilation without making the barn too cold. 8 feet is about the average height.

Temperature

Let us say, at this point, that it has not been found necessary to keep the temperature of the dairy barn up to 60 degrees to secure the most economic milk flow. The temperature must always depend upon the humidity of the atmosphere. In well ventilated barns the temperature may go as low as 40 degrees and the cows will not feel any harmful effects. From 40 to 55 degrees is a safe range, in well ventilated barns.

BARN OF INDIAN INDUSTRIAL SCHOOL
[illegible] MANITOBA

Stable Doors

In providing for stable doors, see that stock sizes will be used. Have doors as high as possible. The split door, opening both ways, is best.

Doors for Manure Carrier Track

Fig. 206 shows a hinged doorway fitted the best possible way for an overhead track. The doorway should be the full height of the stable ceiling or main sill. First run the track out through the doorway as high as possible, cutting a narrow piece out of the top of the door frame if necessary, as in Fig. 205. Then neatly cut a section from the upper corner of the doorway opposite the hinges, equal in depth to the distance from bottom of track up to the door jamb and long enough just to allow the door to close tightly against the track. Nail the piece removed from around the track securely in the door frame and trim just sufficient off the edge next the track to allow the travellers to pass it. Fig. 206 shows clearly this piece removed from the door and nailed in the upper left hand corner of the doorway. When the door is closed, a very small opening is left to one side of the track and there are no small doors to bother with.

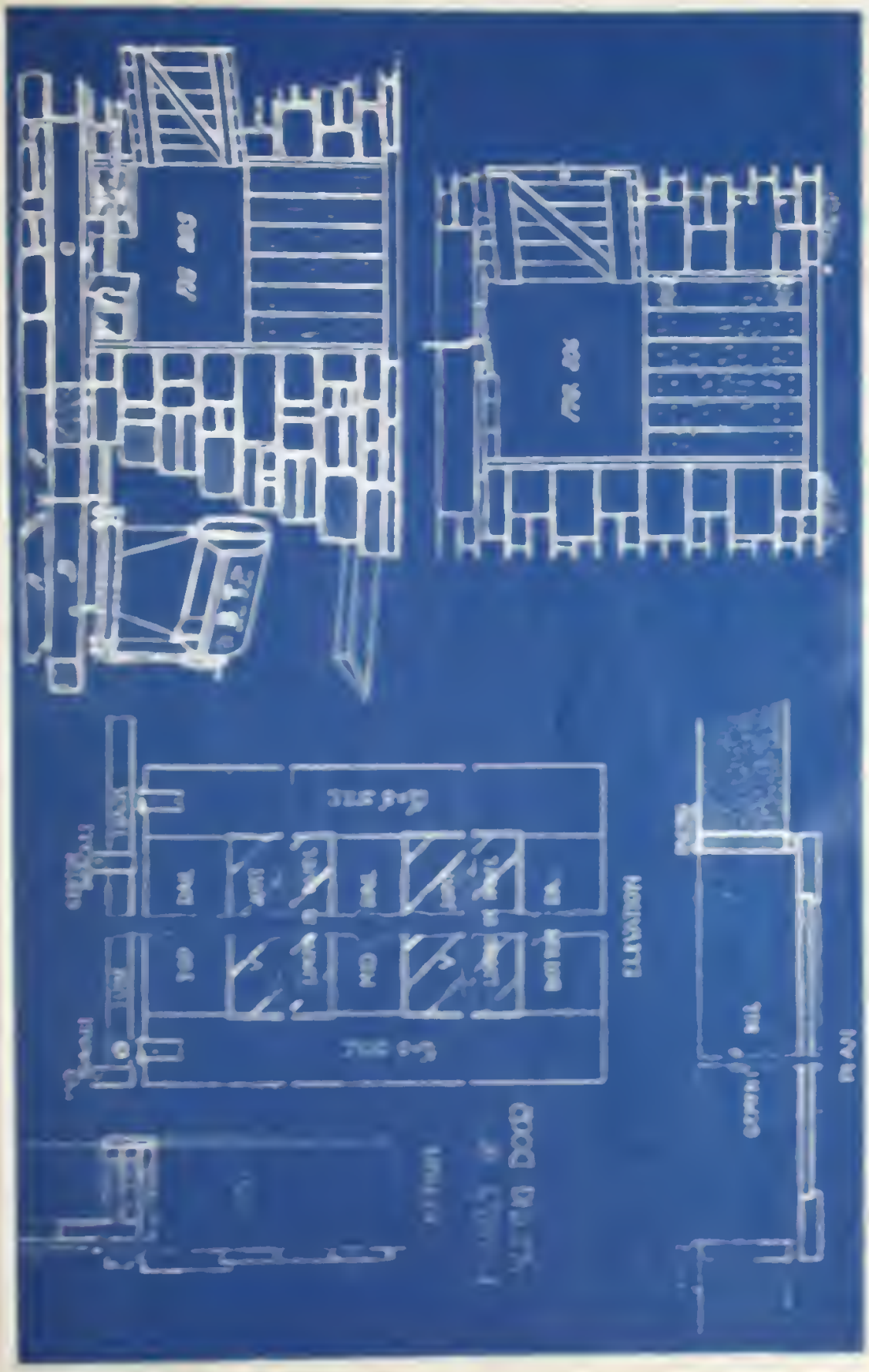
Fig. 205 shows how a doorway with a fanlight should be fitted for an overhead track. The track should be hung just far enough below the main sill of the barn to allow the carrier travellers to pass underneath it. It is very important to keep the Manure Carrier as high as possible in the stable so that it will be well above the manure pile or waggon where dumped. The underside of the doorway lintel should be at least as high as the underside of the main sill. In the illustration, the underside of the sill (b) and the plate (c) are on a level, so a piece 2 inches wide is cut out of the top of the door frame to allow the traveller to pass through as high as possible. The severed cross piece is securely spiked to the plate. The transom between the fanlight and the doorway is cut open to the width of 12 inches and a box frame is set in, supporting a pair of small doors which close tightly against the track.

Barn door track is recommended in preference to hinges. Where the track is used, there is no trouble with doors slamming in the wind. Sliding doors are not blocked by ice or snow and no paths have to be dug for them. By the use of weights, they can easily be made self-closing. There is no sagging weight on the sides of the barn. The trouble with broken hinges and damage to the walls where they are fastened, is avoided.

A tube track is preferred, rather than a round track. The hangers run inside the tube and are not affected by the weather.

Plenty of Sunlight

Some people have the idea that a dark barn is snug and comfortable. They think that windows make a barn cold. As a matter of fact, a well lighted barn is warmer at any time of the year than a poorly lighted one,



other conditions being equal. Dark barns are more likely to be damp. They form an ideal seed bed for establishing tuberculosis, rheumatism and kindred diseases in the herd.

Sunlight is the greatest disinfectant and disease preventive in the world. It does not cost you anything.

Municipal authorities, food inspectors and health officers insist on having plenty of light provided in dairy barns.

At least 4 square feet of window space should be allowed for every animal. In designing new barns, we specify a window about 2 feet 10 inches x 4 feet 6 inches every 3 feet. This is preferable to larger windows set at greater intervals.

Windows should be flush on inside to prevent accumulation of dust. If they cannot be built this way, splay the wall around them. Splaying allows the sunlight to spread out and flood all parts of the cattle stand.

Place the windows 3 feet 6 inches or 4 feet above stable floors. Run them vertically, not horizontally, for much more light can enter the vertical window.

For the sake of effective lighting, barns should run north and south. The long rows of windows will thus be placed on East and West sides where they will receive the direct sunlight, which is most powerful in destroying disease germs. Very little direct sunlight enters at the north.

Sunlight is usually interfered with seriously in bank barns. Some overcome the difficulty by removing dirt from the top of the bank.

For our cold climate, stable windows should be double glazed, especially if the barn is in an exposed position. Single sash window is the kind to use.

One-storey dairy barns are best lighted when built with a monitor roof. Light enters through the top as well as the sides of the barn.

The sanitary steel stalls should be used so that sunlight will not be obstructed.

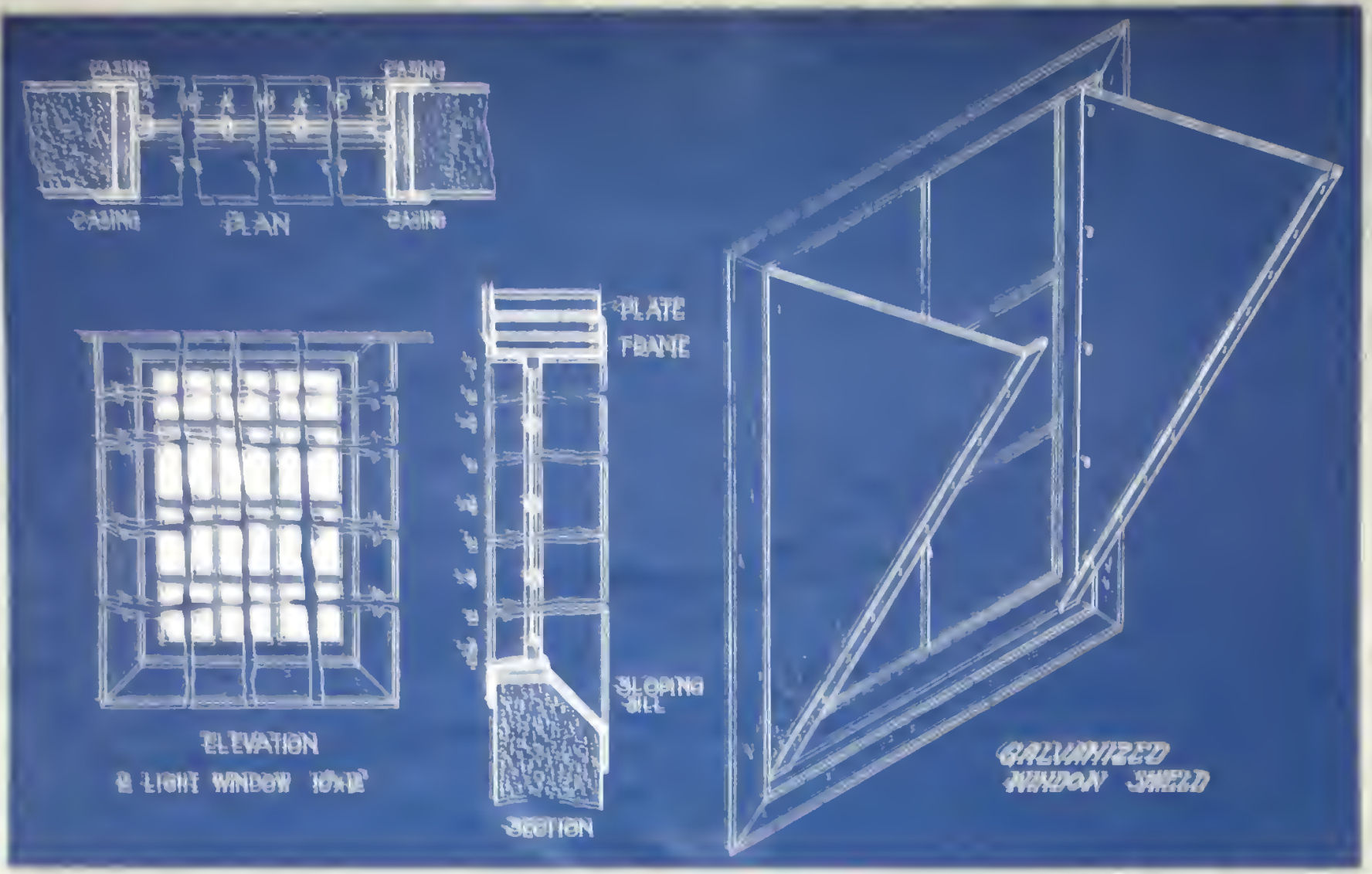
Windows may be hinged at the bottom and allowed to swing inwards, preventing direct draughts on the cattle. When open, they rest against galvanized window shields, illustrated on next page.

Window sizes are governed by sizes of panes. There are 8 x 10, 10 x 12, 10 x 14, 12 x 14, and 10 x 16 stock sizes. Twelve-light windows are usual. To save expense, always use a stock size of windows.

12-light windows of 8 x 10 panes is 2 feet 4 inches x 3 feet 9½ inches.

12-light windows of 10 x 12 panes is 2 feet 10 inches x 4 feet 6 inches.

Construction of windows is illustrated on page 301.


CASING
CASING
CASING
PLAN
CASING
PLATE
PLATE
SLOPING SILL
SECTION
ELEVATION
2 LIGHT WINDOW FRAME
GALVANIZED
WINDOW SHIELD

Ventilating the Barn

In 1756 an Indian Rajah shut 146 English prisoners in the Black Hole of Calcutta. They were confined in a cell 14 feet 10 inches by 18 feet and having but two small windows.

What happened?

We all know the story. All but 23 died during the night.

Starvation was not the cause of death, nor thrist, nor physical violence.

They died for lack of air. Lack of a current of fresh air to pass through the building, the foul air being carried off above. In other words, lack of ventilation killed them.

John Jones had a dairy cow. He fed her well. Gave her lots of water. But she always was a "boarder" cow, never paid a profit, and by and by she had to be killed for tuberculosis.

What was the cause?

If you don't know the story, we will tell you.

More vitally essential to the life of that cow than water, or feed, or kind treatment, was fresh air. She required just 7,718 pails of it in 24 hours, 5 1/3 pails every minute of her life. Pile up all the feed she could possibly have consumed in a day. Pitch all the water she needed on top of that. Weigh them. The weight will not equal half the weight of air she must take into her system if she was to have lived.

What's in the air?

Oxygen. That's the life-giving element.

There is also nitrogen and there are smaller quantities of other gases. But it's the oxygen that combines with the food matter carried by the blood and gives the cow vitality, gives her strength, power to produce milk, power to resist disease.

But the cow had air. It was stable air, and she breathed it in over and over again. Yet it was air.

Was it fresh air? Remember that when air is discharged from the lungs it contains 4 per cent. of Carbon Dioxide, which is deadly poison. A cow breathes out over 307 pails of this poisonous gas every day. Put a dog or a cat or a cow or any other animal in a room of this undiluted gas and death will follow in a few seconds.

As quickly as that gas is breathed out it must be removed. And it must be replaced by pure air from the outside.

7,718 pails of fresh air must be brought to every cow in your stable, every 24 hours. More than that for every horse. Less than that for smaller stock. Every 24 hours 7,718 pails of foul air have to be taken out again and in that foul air are 307 pails of poison gas.

That's your problem.

John Jones had the same problem. But he tried to bring the fresh air through 6 small tiles at the top of the wall and a broken window. Sometimes he left the doors open. But on the first cold day he shut them again and stuffed a sack in the window. So the cow got sick and died.

To create and regulate a current of fresh air which pours into every corner of the building and is carried out again when it is foul, is ventilation.

But, ventilation does more than carry off bad air.

It takes away the moisture.

Hold a mirror in front of your mouth as you breathe and you will observe that the surface is quickly covered with tiny drops of water. There is water vapor in the breath and it condenses on the glass.

A cow breathes out moisture like this, and in 24 hours it amounts to 1 2/5 gallons of water. 30 cows in a stable will load the air with 1 1/3 barrels of water daily.

Ever go into a barn on a cold day and see the steam rising like a fog? It's a sign that the air is saturated with moisture.

Excessive moisture in the barn is not only harmful to the cows, but rots the woodwork, the sills and the timbers.

Good ventilation prevents the formation of ammonium carbonate. The carbon dioxide from the lungs unites with the ammonium fumes around the manure in the gutters, forming this carbonate. It falls as a whitish coating on the beams, and the harness in the barn. This substance rots leather, woodwork and paint.

When ventilation is so important for the sake of your barn and the health of your cows, it will surely pay you to install and operate a good system.

By actual test, it has been shown that cows in a well ventilated barn give more milk than the same cows could give in a poorly ventilated building.

Fresh air costs you nothing. A good system of ventilation is very inexpensive. It is not hard to install. It is easy to operate.

Do not build a barn without investigating this important matter.

Remember that there is no effective ventilation until you have a *system*, that is, a number of intakes and outlets for the air, correctly installed, well controlled, and working with certainty in all kinds of weather.

Something more is needed than the crude practice of opening doors, allowing draughts to strike the animals, or the old idea that enough air could get through the knot holes or cracks in the walls to keep the animals supplied.

Many systems of ventilation are known. None of them are perfect. The two most widely used are the Rutherford and King Systems. The King system is widely used in the States, but for our severe climate, the Rutherfor system has proved much superior to any other system.

The Rutherford System

Notice your kitchen stove.

You open the damper at the bottom. You allow a draught to pass into the fire. The oxygen of the air allows the fire to burn. The carbon dioxide and other gases are formed. They are hot and lighter than air, so they rise and pass out of the chimney.

The Rutherford Ventilation System is based on this old, simple idea.

The animals breathe out warm air, and this with their body heat raises the temperature of the stable. The warm, foul air rises to the ceiling and escapes through the outlets above. As quickly as this, it is replaced by fresh, cold air which comes in through ventilating dampers or inlets below.

The King System

Those who favor the King System hold that foul air, charged with heavy carbon dioxide gas is heavier than fresh air. Therefore, they say, it must drop to the floor. So they bring their fresh air into the stable at the ceiling and allow the foul air to escape through ventilators which come right down to the stable floors. The air in the outlets is warmer than the air outside, so must rise.

Advantages of Rutherford System

The Rutherford System is simpler and less expensive. Intakes are not costly, ventilating flues can be built quite inexpensively and a neat cupola, costing but a few cents, framed to prevent snow or rain entering the flue. The King System, on the other hand, requires expensive and specially constructed cupolas.

The outlets required by the King System are often built up from the stable floors, and are in the road, taking up valuable space.

The Rutherford System will work well every day of the year, and under any climatic conditions. The King System has shown itself to be a decided failure in cold climates. There is a great danger that, unless a strong wind is blowing, the air current will be sluggish. It is necessary to force an air current by artificial means, and for this the costly cupola is required. In Canada, the King System does not rid the barn of the humid air. There is condensation of moisture in the outlets, and on the ceiling, and constant dripping. One reason is the fact that moist air is light and rises. The outlets of the Rutherford System being at the ceiling, allow it to escape freely. But, with the King System, which seeks to ventilate the barn by lifting the foul air from the floor, there is no place for the escape of any moist air which rises to the ceiling.

Moist air is at fault on the animals as foul air, and they cannot stand a few degrees of frost in a damp stable as in a dry one. It is one of the chief causes of tuberculosis.

Ventilation Intakes and Outlets

In order to ventilate a barn properly, there must be a certain amount of air space for each head of stock. Too many cattle in a stable make it difficult to ventilate without harmful draughts for intakes and outlets have to be made very large. If there are too few, it is hard to keep the temperature up to the comfortable point and yet maintain a sufficient air current. Right here, let us say that low temperature does not always mean pure air. The air in a stable where the thermometer shows several degrees of frost may easily be most vile.

It has been found that the Rutherford system will work best when each cow has at least 600 cubic feet of air space. Horses require more and smaller stock less. Thus 600 cubic feet has to be changed constantly, 4 or 5 times every hour of the day, 600 cubic feet of fresh air must be brought in and the same amount allowed to escape through the outlets.

With these requirements in mind it has been found that for every cow in the stable there must be at least 8 square inches inlet area. It is customary to install one intake big enough for several animals. The BT Ventilator, page 300, has a maximum capacity of 48 square inches and will do for 6 cows.

The same ideas govern the size of the outlets. It is customary to provide almost twice as much outlet area as inlet area, or about 15 square inches for every mature cow. One big outlet vent is provided for a number of animals. A vent less than 18 x 18 or 16 x 16 at the very least is not practical. There should be one outlet 18 x 18 for every 20 cows in the stable. If outlets are bigger, air currents are likely to be sluggish, and if much smaller there will be danger of dripping.

Roughly, one outlet vent 18 x 18 will do for 20 horses.

These figures apply to mature stock. If there are calves in the stable it will take about 4 of them to use as much fresh air as a mature cow requires.

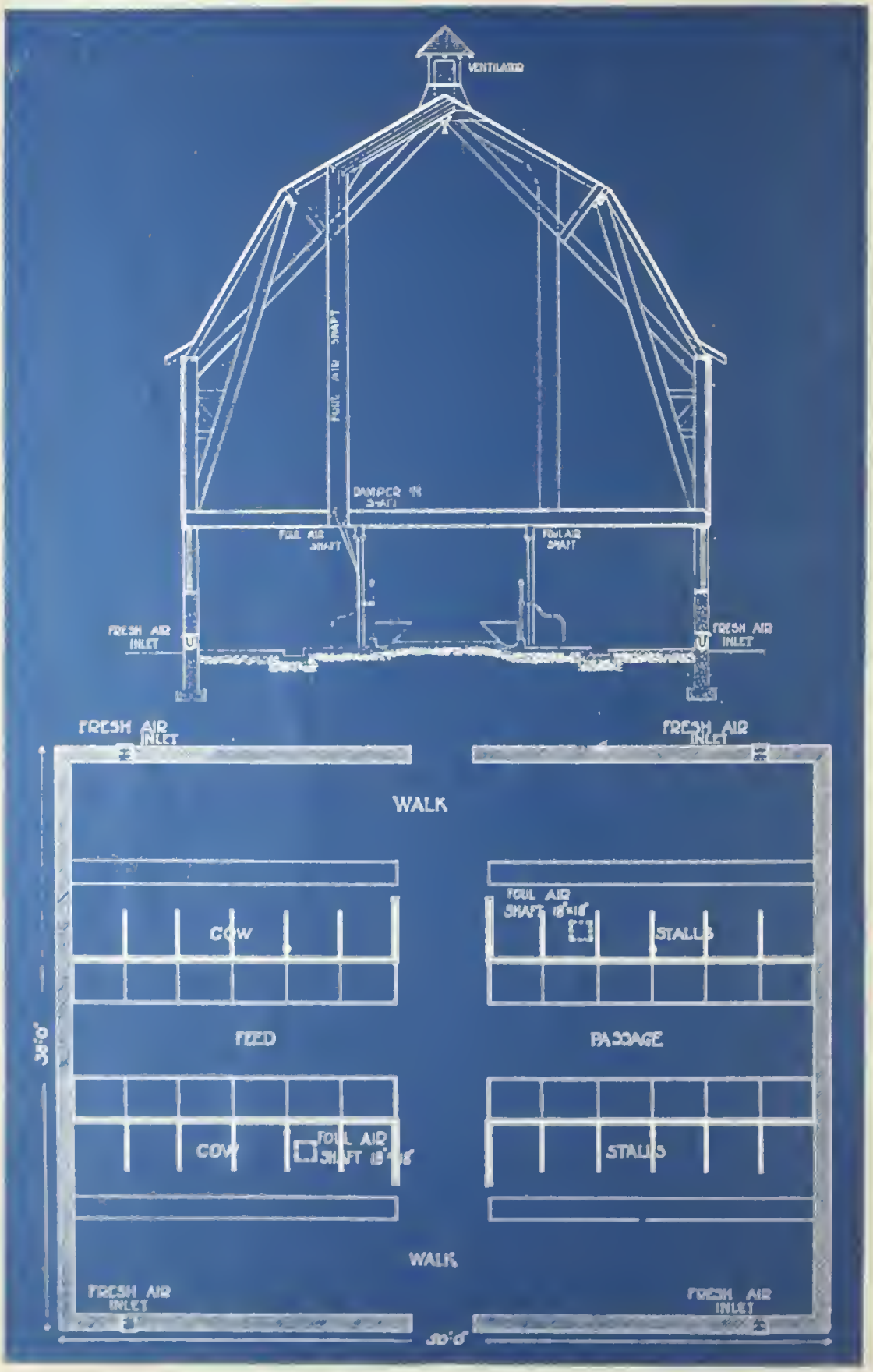
Inlets are distributed around the walls to bring a current of fresh air through every part of the barn. Outlets are never placed opposite inlets as there would be a direct current between them and parts of stagnant air at other places in the barn. If there are two or more outlets, it is customary to place them on opposite sides of the central passage and near opposite ends of the barn.

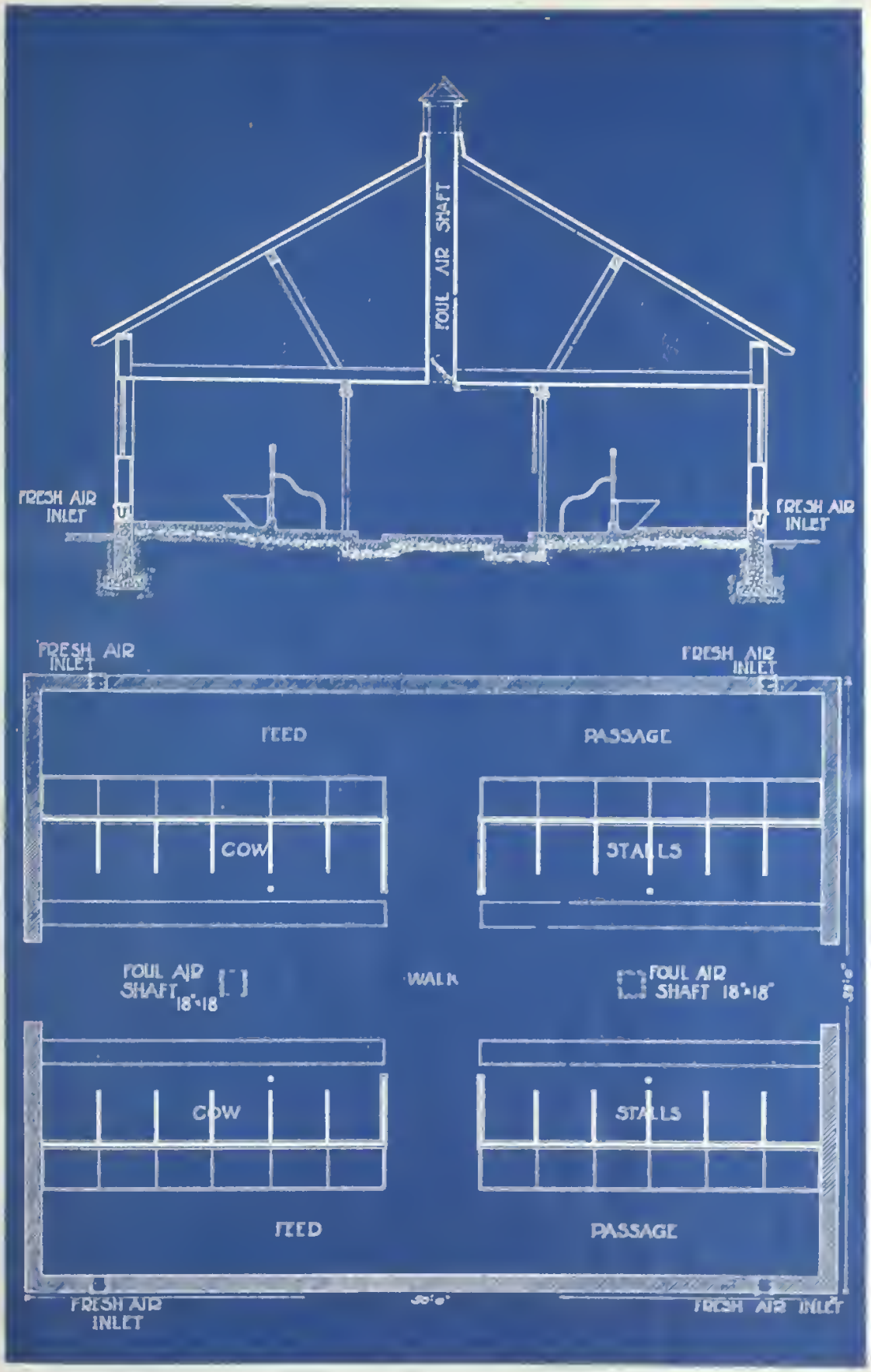
See illustrations on pages 300 and 301.

Ventilation Table

A number of BT Ventilators per stall (Fig. 445, page 300) is indicated in table below. BT Ventilator has a maximum area of 48 square inches.

Stock	Assumed weight	Cu. ft. air space	Cu. ft. fresh air per hour	Inlet area per head	Outlet area per head	No. BT Ventilators per stall
Horse	1,200 lbs.	800	4,000	40 sq. ins.	48 sq. ins.	1 per stall
Cow	1,100 lbs.	600	3,000	30 sq. ins.	36 sq. ins.	1 per 2 stalls
Hogs	100 lbs.	80	1,000	8 sq. ins.	8 sq. ins.	1 per 12
Sheep	100 lbs.	784	920	24 sq. ins.	24 sq. ins.	1 per 10


VENTILATOR
FOUL AIR SHAFT
DAMPER IN SHAFT
FOUL AIR SHAFT
FOUL AIR SHAFT
FRESH AIR INLET
FRESH AIR INLET
FRESH AIR INLET
FRESH AIR INLET
WALK
FOUL AIR SHAFT 18"x18"
COW
STALLS
FEED
PASSAGE
COW
FOUL AIR SHAFT 18"x18"
STALLS
WALK
FRESH AIR INLET
FRESH AIR INLET
30'0"
30'0"


FOUL AIR SHAFT
FRESH AIR INLET
FRESH AIR INLET
FRESH AIR INLET
FRESH AIR INLET
FEED
PASSAGE
COW
STALLS
FOUL AIR SHAFT 18"x18"
WALK
FOUL AIR SHAFT 18"x18"
COW
STALLS
FEED
PASSAGE
FRESH AIR INLET
FRESH AIR INLET

Construction of Outlets and Inlets

Detail of ventilating shaft, ventilator on the roof, ventilation intake, is given on page 309.

The outlet flue, like a good chimney, must be air tight. It should be constructed of two layers of number one matched stuff, 7/8-inch thick, with building paper or deadening felt between, to make it as nearly as possible a perfect conductor, and preventing the cooling of the air in the flue. Corner posts are 4 x 4, ripped diagonally. It must be air tight, for every crack lessens the ventilating power. The interior surface must be smooth, having ample cross section area, and be built as straight as possible to prevent friction of air currents. In case of a slight angle, the cross section area at the angle should be increased 25 per cent. to offset friction loss. It must rise 15 or 16 inches above the top of the barn and be protected with a roof. It is not a good thing to use ventilating flues for hay chutes, because the foul elements of the air being carried out are deposited on the hay and feed and returned to the cows. Tuberculosis can be spread among the whole herd in this way. Every outlet should have a controlling damper.

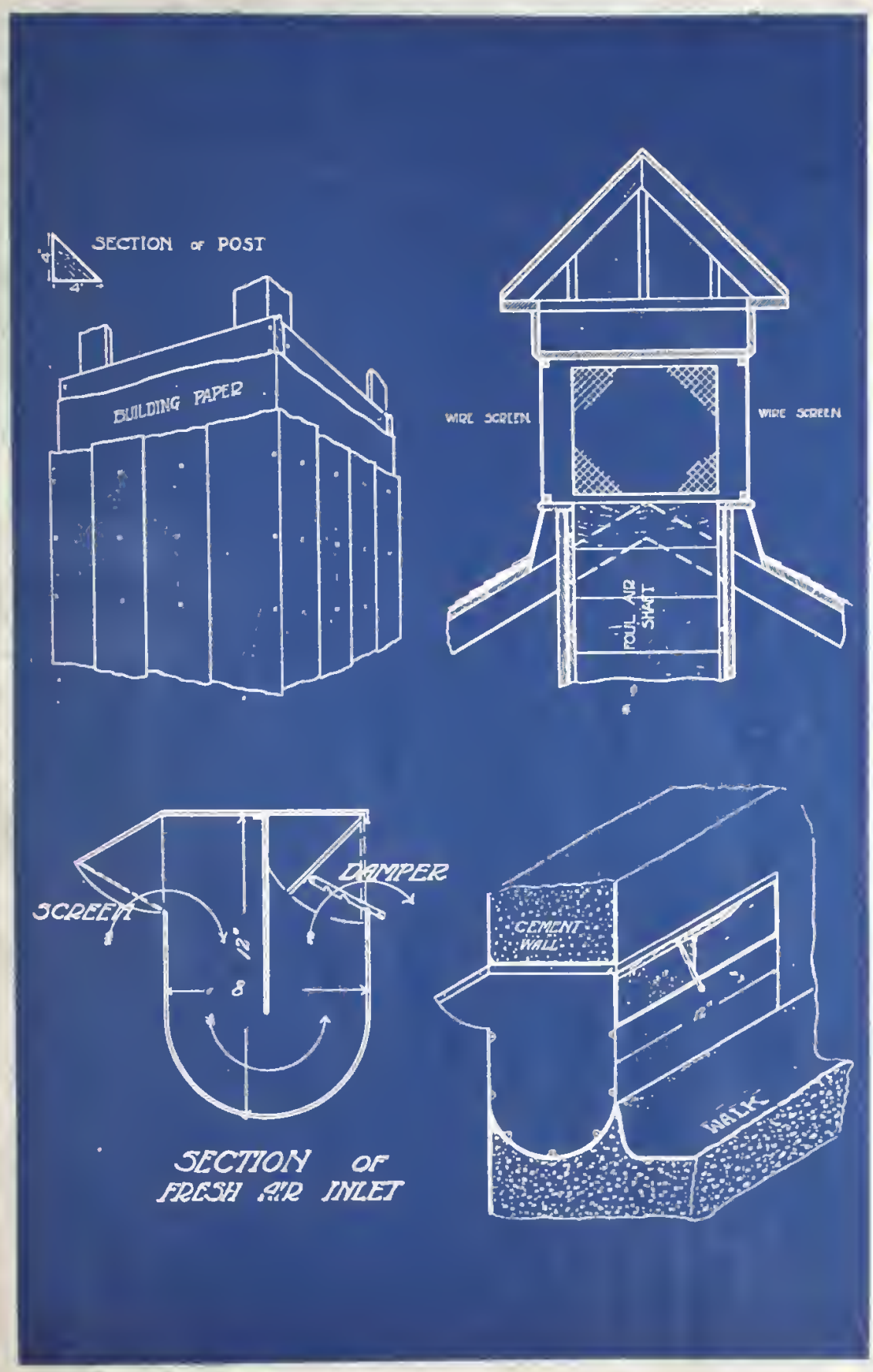
BT Fresh Air Inlet—Fig. 445

The BT Ventilation Intake, Fig. 455, is model. Its maximum area, 48 square inches, is not sufficient to cause injurious draughts on the stock. A hood on the outside prevents snow drifting in and a screen keeps out insects. The bottom of the inlet is placed on a level with the floor so the opening comes about 8 inches above the floor.

It is fitted with a damper so that air current can be controlled. This is an important point to observe in the construction of both inlets and outlets. Dampers are just as essential in them as in a stove pipe. Changing temperatures and velocities of air currents have to be provided for, and often some of the stock are removed from the stable so that a much smaller current is required.

Any intake, whether constructed of steel or wood, or tile, must adhere to one principle viz: it must direct the air current downward. Otherwise there will be a direct harmful draught on the cows. As well a straight tile or box in the wall sometimes allows currents of air to pass out as well as in, upsetting the whole ventilation system.

Dampness in the stable is not always the fault of ventilation. Stone walls or solid cement walls must be wood lined, otherwise no system of ventilation would ever keep them dry in very cold weather. It is better to build walls with some sort of layer of insulation or dead air space to prevent too rapid conduction of heat. Ceilings should be ceiled over beneath the joists.


SECTION of POST
4"
4"
BUILDING PAPER
WIRE SCREEN
WIRE SCREEN
FOUL AIR SHAFT
SCREEN
DAMPER
12"
8"
CEMENT WALL
12"
WALK
SECTION OF FRESH AIR INLET


BARN OF SHANNON BROS.
CLOVERDALE, B. C.

Layout of the Stable

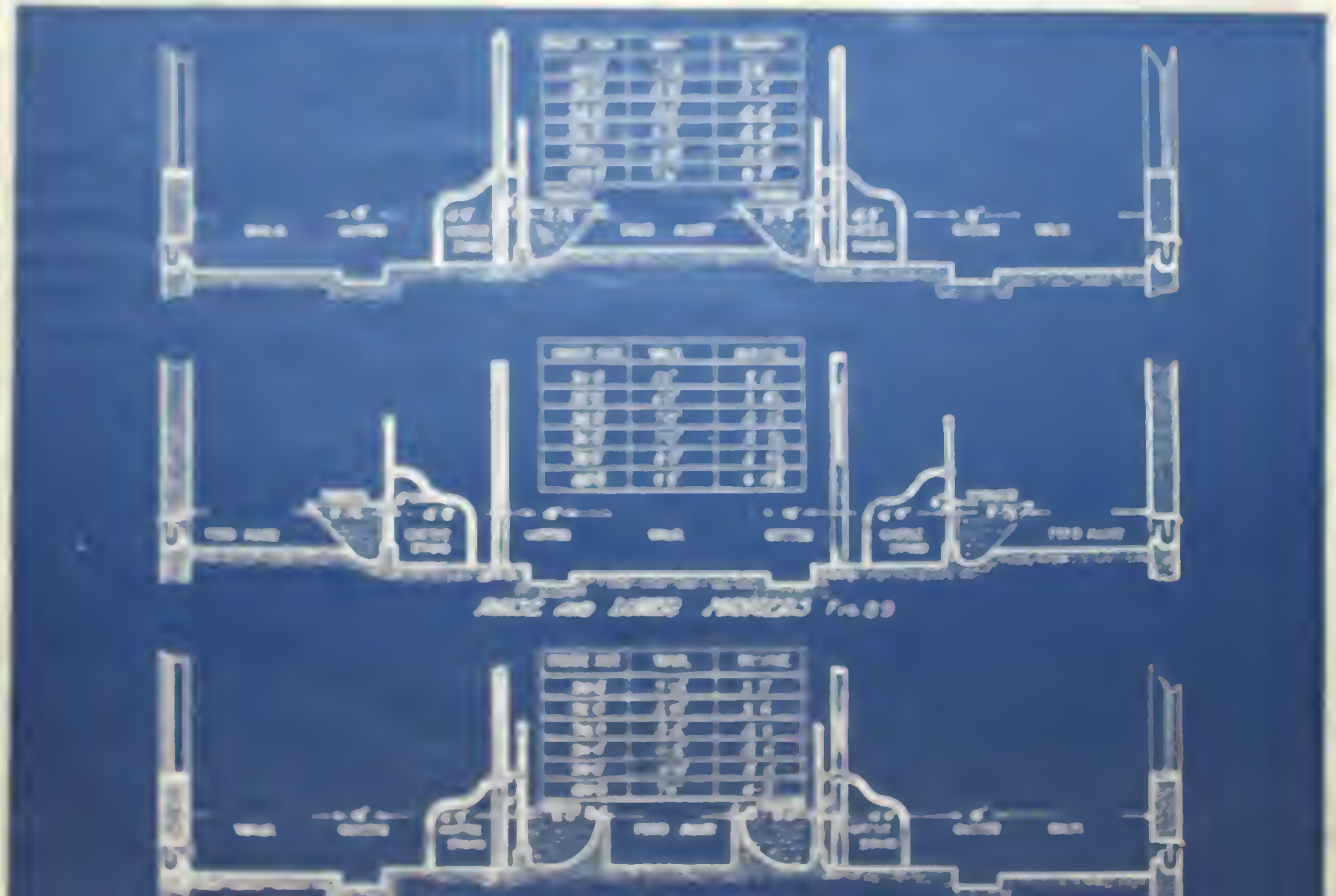
Usually the first question to decide, once the general design and size of barn has been settled, is the method of placing the cows, whether to have them facing in or out. There are arguments both ways, and we will give them all.

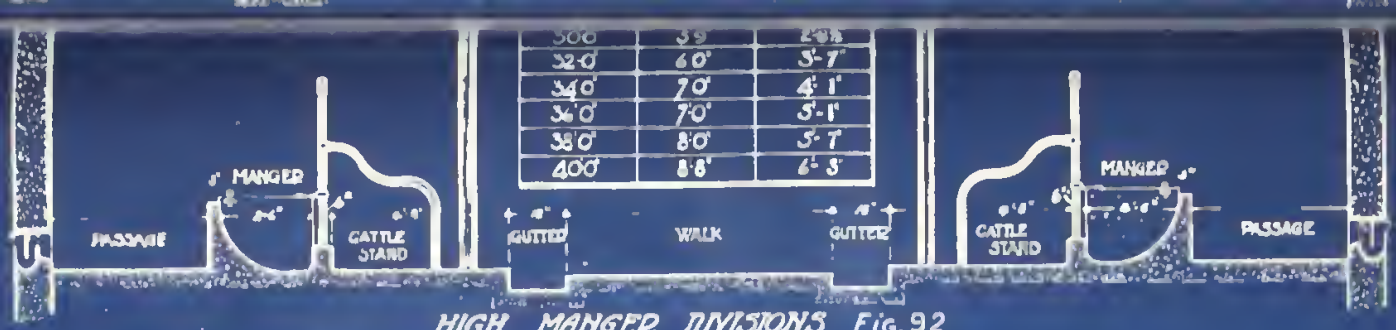
Face in:

1. You get the light on the business end of the cow.
2. You have better light for the greater part of your stable work.
3. You can see better whether cows' udders are clean or not.
4. It is easier to feed along a central passage, as the feeding of both rows can be done on the same trip. It also helps in the arrangement of the feed room to have just the one passage. Whether cows face with heads in, or out, each gutter must be cleaned separately, so no time is saved in cleaning the stable by having the cows face out.
5. Modern stable construction methods always make feed passages and mangers much higher than cattle walks and gutters. Therefore, when cows face in, the central part of the stable is highest and the sides the lowest, since the gutters are near the sides. You have drainage towards the outside, which is easier to arrange than drainage toward the center.
6. It is not well for the cows to stand facing the light.
7. The ventilating system works better when cows are placed side by side in, as the outlet flue can be directly above their heads to remove the foul air.
8. Supporting posts, which cows are head to, must be placed at the narrowest part of the animal and do not take up the room she needs to lie in.
9. There is less confusion in having the cows turned out as they have only one place to go to.

Face out:

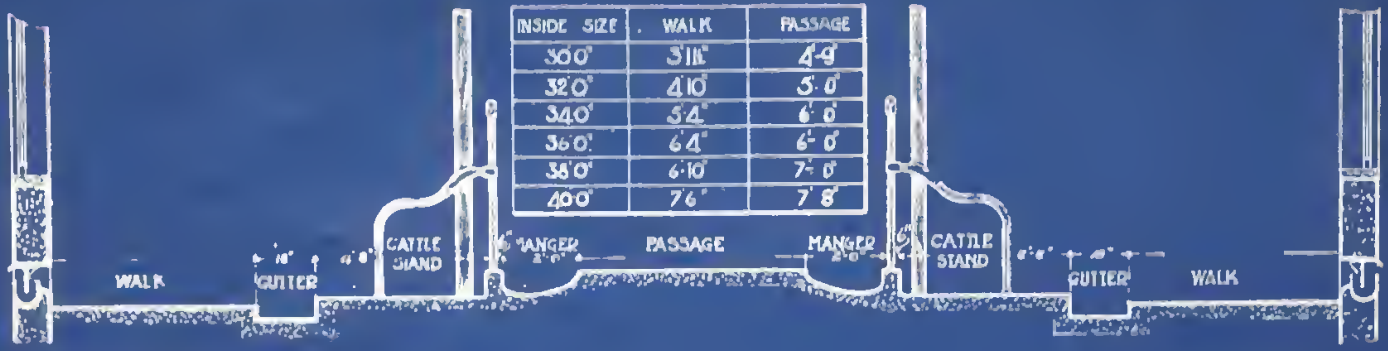
1. Cleaning, milking and other forms of the work is done behind the cows. Therefore, narrower cattle walks are used.
2. No danger of cows breaking into one another's feed.
3. Herd does not have to be divided in going to the stable.
4. Cows are tied up from behind. The feed cart arrangement fits on the whole herd at the one time.
5. Advocates of this arrangement say that when cows face in the manure from the gutter splashes on the walls.
6. This arrangement is still widely practiced in dairy barns for stable-hut cleaning.



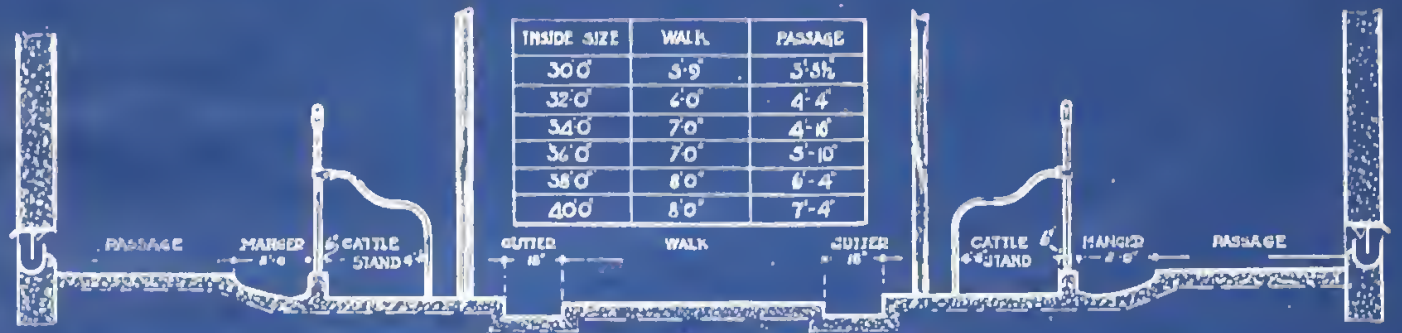


32·0	6·0	5·7
34·0	7·0	4·1
36·0	7·0	5·1
38·0	8·0	5·7
40·0	8·8	6·3

HIGH MANGER DIVISIONS Fig. 92



INSIDE SIZE	WALK	PASSAGE
30·0	3·11	4·9
32·0	4·10	5·0
34·0	5·4	6·0
36·0	6·4	6·0
38·0	6·10	7·0
40·0	7·6	7·8



INSIDE SIZE	WALK	PASSAGE
30·0	3·9	3·5½
32·0	4·0	4·4
34·0	7·0	4·10
36·0	7·0	5·10
38·0	8·0	6·4
40·0	8·0	7·4

HIGH LEVEL FEED PASSAGE Fig. 417

STANDARD WIDTHS OF WALKS AND PASSAGES

Floors

Foundations for floors and walls have been discussed. We have published a booklet, "Making a Model Stable with BT Stable Equipment," which gives detailed instructions about foundations, making forms mixing and laying the cement. This book is mailed without charge to everyone who purchases BT Equipment. We will therefore not give much space here to the subject, but will merely attempt to discuss the principles.

Stable floors must be impervious to water, sanitary, easy to clean, comfortable for the cow, durable, inexpensive and should not rot or wear out.

The old style wood floors fall down when brought face to face with practically every one of these requirements. We unhesitatingly condemn them. It has been our policy for eight years to warn farmers about them.

City and government authorities have for many years delivered attacks of no small violence upon this most unsanitary form of stable construction. One great cause of the spread of bovine tuberculosis is the soaking of liquid manure into stable floors. They harbor vermin. They cannot be kept clean. They rot and require constant repairing. Their appearance in the stable, after a few years use, is not handsome to say the least.

Cork brick, laid on a foundation of cement, is sometimes used. It is made by mixing granulated cork and a special grade of tough asphalt, heating and making into brick form under pressure. The cracks are filled with cement. This brick is somewhat costly. But it is a satisfactory flooring if well laid. Creosote blocks are sometimes used. They should be laid on a cement foundation and with a heavy coating of tar or pitch.

Concrete is the material recommended, and it is most often used. It fulfils all the conditions enumerated above. The objection is sometimes urged that they are liable to be damp and cold. If foundations are properly laid and the floor properly drained, there will be no difficulty in this way. Well built concrete floors are being used in every province of the Dominion, including the Prairie Provinces, and are giving the best of satisfaction. The cost, in many parts of the country, is less than the cost of wood flooring, and it is easy, with cement, to make the manger or gutter any shape.

Floors should have a uniform thickness of 5 inches of which 1 inch is a finished coat of cement mortar.

Feed alleys are laid with a fall of about an inch to manger. When in the center of barn, they are crowned an inch, sloping both ways to mangers. They are finished with steel trowel.

The cattle stands are laid with a fall to the gutter of ¾-inch. For dairy cattle a depression is often built in the platform for holding the bedding. That is, the cattle stand is raised at a distance of 2 feet from the curb and slopes ¾ inch to curb and to gutter. Cattle stands vary from 4 feet 6 inches in length to 5 feet, according to the breed of animal to be tied up. They are given a rough finish with a broom or wood float.

Driveways or cattle walks have a fall to the gutter of about 1 inch. They are also given a rough finish, to give a firm footing to the cows.

To get best results from concrete, it should not be laid in extremes of temperature. However, if laid in cold weather, it may be protected from the frost with straw, laid on just before it begins to set. It should be left on 36 hours. If laid in hot weather, a layer of wet straw prevents too rapid hardening. However, it should not be put on until the surface has begun to set.

Mangers

The type of manger you will build partly depends upon the method of feeding and the size of your barn. There are three types in common use: the Raise-and-Lower Manger, the High Cement Manger, and the High Level Feed Passage Manger. These are illustrated on pages 312, 313, where dimensions are given.

Unless your barn is extremely narrow, either the Raise-and-Lower Manger or the High Cement Manger is the best to use. They are suitable for any kind of feed. The Raise-and-Lower Manger is very easy to build for it simply requires a shallow trough to be made, the Manger itself coming ready made from the factory.

The front of the High Cement Manger is usually perpendicular, but for convenience it can be made to slope in. Both types of mangers are constructed to prevent feed being thrown out by the animal. If any should fall out, it would be beyond her sight. She will not reach for her feed, causing her hind feet to slip and kicking her bedding into the gutter. The proper feeding method is the surest way to keep the cow well bedded. Bottoms of both mangers are an inch above the cattle stand.

The High Level Feed Passage type is inexpensive. Manger and divisions are low, but should the cow throw her feed out of the manger, she can see what she has done and usually will not do it again. In any case, it is easy to brush the feed back into the manger again. This manger is 2 feet wide and 7 inches deep in the lowest part, which is an inch above the cattle stand.

If used for watering, mangers should have a fall of 1 inch in 40 feet, and a manger trap should be used. It is better to use the water bowls, for they keep the water constantly before the cows.

Mangers should be constructed with the aid of a properly shaped templet and should be given a smooth, steel-trowel finish. It is important to give the manger as smooth and as hard a finish as possible.

Curbs should be 8 inches high to prevent feed being worked back to cattle stand by the animal. They should be level and without gaps, for these are difficult to build and cause waste of feed.

Gutters

A properly built gutter is essential to sanitation in the dairy barn. We recommend square gutters, 18 inches wide, 7 inches deep on the cattle stand side and 4 inches on the side of the walk. There may be a half-inch fall from cattle stand side to the walk side which allows the liquids to drain off. Sides should be vertical to break the spatter and make the gutter easy

to clean with an ordinary shovel. There is little danger of a cow slipping when stepping over such a gutter, and it is so big that it will hold all the manure and keep the cow clean.

The cement should be finished with a steel trowel. A smooth, hard finish is easier to brush clean.

Sometimes sloping gutters are built, which slope from the cattle walks to the cattle stand and have a drop of 7 inches on the cattle stand side. These, we believe, are too shallow. Solids falling in them dam back the liquid manure, causing it to spread out over the cattle walk. They are hard to clean, as there is no tool that will fit them.

Gutters should have a fall of 1 inch in 40 feet and be drained at one end with a gutter trap. These traps should be used for flushing gutters, but never for draining off liquid manure. The liquid manure should be soaked up by some absorbent and removed with the other manure either directly to the field or to a good cement manure pit.

Walls

Provided that it is put on the proper foundations, no better material in the world than lumber can be found for stable walls.

Owing to severe winter climates in many parts of our country, it is necessary to build walls with dead air spaces. Many stables have been constructed with expensive, solid walls of concrete or stone, and they would have cost less and been more satisfactory if they had been built of wood. Heat and moisture in a stable are certain to cause condensation on a solid wall. A good wall can also be made with hollow cement blocks or hollow tile blocks and give a more fireproof construction.

Sometimes the sills of the walls are anchored to footings, so that the wood walls commences scarcely 12 inches above the ground. Sometimes the concrete wall is brought up as high as the window sills and from that point frame construction is used. This makes a very desirable construction, as the walls are easily flushed off for cleaning.

For a simple, solid wall of concrete, forms are made of matched sheathing with the smooth side in. These are supported by 2 x 4 studs set 18 inches on center.

A wood wall is built outside of 1-inch tongued and grooved lumber, or shiplap (dressed one side so that it may be painted) laid over ½-inch rough lumber with a thickness of building paper between them. Studding is placed every 24 inches and inside studding is one thickness of building paper and 1-inch tongued and grooved stock, dressed smoothly and whitewashed.

If shiplap is used for siding, it should be laid horizontally. Tongued and grooved stock is better to be nailed on vertically, as by this plan the danger of water beating into the cracks 12 or 14 inches apart is lessened.

Galvanized [illegible] a small [illegible] largely for siding. It is very durable and fireproof [illegible] be built [illegible]

Cost of Cement Work

Cost of concrete work for stable floors is not difficult to calculate.

A 1.2.4. mixture is used, that is, 1 of cement, 2 of sand and 4 of gravel. Cement may be taken at $2.00 per barrel, sand and gravel each at $1.00 per yard.

Floors are usually 5 inches in thickness, but it is customary to allow another inch to provide for mangers and curbs.

First, find number of cubic feet in the floor, by multiplying length and breadth (taking measurements inside the walls) by thickness of floors. In a barn 36 x 60 inside, for 32 cows, this would be 1,080 cubic feet.

The rule for amounts of cement, sand and gravel is:

Multiply by .058 for number of barrels of cement.

Multiply by .0163 for number of yards of sand.

Multiply by .0326 for number of yards of gravel.

1080 x .058 = 62.640 at $2.00 per bbl.	$125.28
1080 x .0163 = 17.604 at $1.00 per yd.	17.60
1080 x .0326 = 35.208 at $1.00 per yd.	35.20
	$178.08

Cost is about $5.56 per cow.

Cost of walls can be worked out in a similar way. 1.3.6 mixture is used for walls. Multiply by .041 for barrels of cement, .0174 for yards of sand, and .0348 for yards of gravel.

Number of barrels of cement in a floor 100 feet square is 2.9. In a 100 cubic feet of wall there are 4.1 barrels of cement.

Columns

Steel supporting columns are recommended because they do not obstruct light. They take up very little space. They are fireproof and durable, and are very neat in appearance.

The columns support the mud sills or beams, upon which rest the joists. Therefore, the positions of the columns are determined by positions of mud sills. These are generally [illegible] rt, so there is one column every 12 or 14 feet through the s[illegible] 16 x 34 [illegible] or 3-foot 6-inch stalls between every column. It is [illegible] 38 [illegible] y rather than too few.

Measurements for Stalls and Box Stalls

Cow stalls are from 3 feet to 4 feet in width. 3 feet 6 inches in the most usual measurement. It is economical and at the same time does not cramp the comfort of the cow.

Cow stalls in depth, from curb to gutter, measure 4 feet 6 inches to 5 feet, depending largely upon the breed of cattle.

9 feet x 10 feet makes a good box stall for a bull. Cow pens will do 9 feet x 9 feet.

Hog pens are built with 10-foot or 12-foot fronts and 2-foot gate. They are usually 12 feet deep. This is sufficient for 8 or 9 hogs.

Horse box stalls should be 12 feet x 12 feet, and not less than 10 feet x 12 feet. Tie-up stalls for horses are 5 feet to 6 feet wide x 9 feet long.

Horse Stalls

Some farmers stable their horses in the same barn with the cows. Horses should always be at the north end, leaving the sunny south part for the cattle. This position is usually more convenient for attending to both horses and cattle.

There should always be a partition between the horses and cows. The cost of boarding this up is not great. Odors from the horse stable should not be allowed in the dairy barn, and it is not desirable to disturb the cows by any of the confusion of hitching and unhitching horses.

Calf Pens

When calf pens are required, if they cannot be put in a separate calf barn, it is well to have them in the horse barn where their bawling will not worry the mothers. Of course, if they cannot be placed here, have them at either end of the row of cow stalls. The same ideas should be followed in placing the bull pen. Have the pen near the door to make in unnecessary to take the bull along the passages near the cows.

Silos and Feed Room

Silos are usually placed near ends of a rectangular barn, to hide as little light as possible. In a T-shaped barn, silos are invariably in the angles between the stroke and top of the T.

Silos should not be built too close to barn yards. It is not well to have the feed so close to the manure pile, nor to be forced to haul corn for cutting into ensilage, through the yard.

There should be a feed mixing room near the silo. It is convenient for taking care of the ensilage as it is thrown down. This room should be large enough to allow different kinds of feed to be brought together in it and mixed. It should be so placed so that it would be handy to the supply of feed and the cows. Many keep the cutting box, grinder and root pulper in the feed room.

If there is a drive-way, a small root cellar, or combination root cellar and feed room may be built under it.

Silos

There is no more paying investment on the farm than a silo. If you can't put it up when you build, plan for it, and have it built the next year. A silo takes care of the product of ten acres or more of land, displaces a large amount of forage and a corresponding amount of storage space for hay or green feed in the barn.

Silos should be located where they will be handy for filling and feeding. They are put where they will screen as little light as possible from the dairy stable. A western location is better than the north, to avoid danger of ensilage freezing. Sometimes they are put in the barn to save roofing, painting and anchoring, but there is trouble with the odors from the silo permeating the stable and giving a taste to the milk.

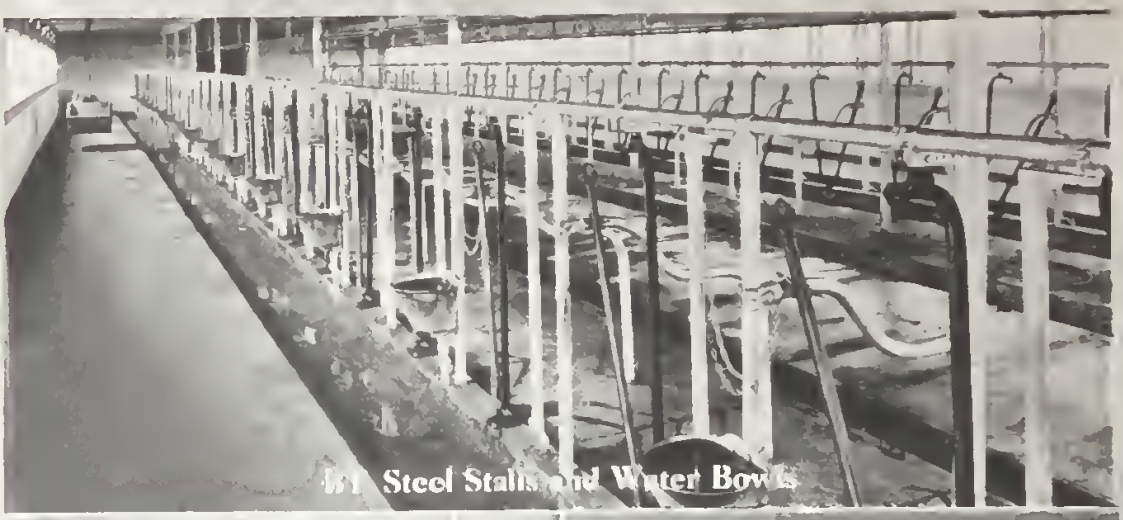
Concrete, brick, vitrified tile and wood are used for silos. They are invariably round, for the amount of building material required to construct a silo of given capacity is less for a round silo than for a structure of any other shape.

The size depends on number of cows and the length of time you expect to feed them. The diameter should not be over half the height, and not more than 20 feet at most. If a silo is made too wide, the ensilage is apt to mould over the surface before you can get it fed, or you are apt to feed too much, wasting it and injuring the cows. There might also be difficulty with ensilage hardening around the walls. It is better to have a medium sized silo where you can take off enough every day to prevent these troubles. Two medium sized silos are better than a very large one.

Table of Capacities

Sizes.—As a matter of convenience in helping to select the size of silo required, we give below list of regular sizes, the capacities, and number of stock that can be fed.

Dimensions	Tons Capacity	No. of Cows it will keep for 6 mos. 40 lbs per day
8 x 20	19	4
8 x 24	22	6
10 x 20	28	7
10 x 22	31	8
10 x 24	34	9
10 x 26	37	10
10 x 30	43	12
12 x 20	40	11
12 x 22	45	12
12 x 24	50	13
12 x 26	54	14
12 x 28	57	15
12 x 30	60	16
12 x 34	68	19
14 x 22	62	17
14 x 24	67	19
14 x 26	72	21
14 x 28	78	22
14 x 30	83	23
14 x 34	93	26
16 x 22	81	23
16 x 24	86	25
16 x 26	95	26
16 x 28	102	29
16 x 30	108	31
16 x 34	110	31
16 x 38	122	33



BT Steel Stalls and Water Bowls

Cleanliness Cows Face to Gutter

Cows Resting in Comfort

BT Hay Carrier

Horse Stable

Fitting up the Cow Stables

Most stables being built now-a-days are fitted up with the Sanitary Steel Stalls. These let the sunlight flood into every corner. Sunlight kills disease germs. The steel does not harbor vermin. It does not soak up manure. It is clean and easy to keep clean.

BT Steel Stanchions are comfortable for the cow. They allow her to lie down on either side, lick herself right back to her flanks, and lie in her stall just as comfortably as if she were out in the pasture. There is nothing to chafe her skin, no weight on her neck. At the same time she is lined up to the gutter so the manure cannot fall on the cattle-stand.

The steel equipment is everlasting, for it never rots or breaks or burns. BT Equipment is galvanized so it will not rust.

Water Bowls

Water Bowls keep a supply of fresh water constantly before the cows. They are never forced to drink ice cold water (which sometimes causes indigestion). The water is kept at an even temperature. The cattle are never thirsty. Water Bowls increase milk production so that they pay for themselves in 90 days.

BT Sanitary Steel Pens

Steel pens for calves and the bull are necessary as steel stalls for the cows. BT Steel Pens are also made for cows, steers and for hogs.

Steel Fittings for the Horse Stable

Steel Guards allow the sunlight to flood through the horse stable. Horses cannot disfigure them by cribbing. Steel Stall Posts last forever. No amount of battering will hurt them. Steel Mangers, Oat Bowls, Hay Racks, Swinging Fronts, Box Stall Doors, are also durable, convenient and sanitary.

BT Manure and Feed Carriers

A Manure and Feed Carrier Outfit cuts stable work in two. The Manure Carrier will take out 800 pounds at a time. It runs along an overhead track as far from the barn as you please, and keeps the manure pile a good distance away. A child can push it. There is no heavy lifting. It pays its cost in a single winter.

BT Hay Carriers

Almost every barn has a hay carrier, so little need be said about them. We recommend our Tolton Sling Car, which will handle a load with two lifts. It is the biggest, strongest, fastest and most reliable car made. Many farmers have found that it has paid to take out their old wood track or rod track outfits and replace them with our Big Tolton.

Our Free Barn Plan Service

[illegible]

Some Don'ts

[illegible]

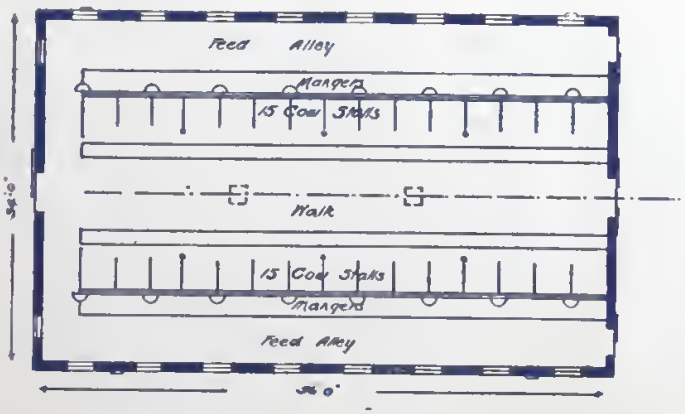
No. 9

This illustrates a very economical plan for a dairy barn. The type of construction is inexpensive and the measurements are cut down as closely as possible, still leaving fair room for walks and feed passages.

This one-storey type of construction makes a sanitary dairy barn. It is easily and quickly constructed and can be added to without difficulty at any time. When a feed barn is already up, this type of barn can be used to good advantage. The cows may be arranged to face in, as in number 10, if desired.

Price of complete plans, bill of lumber and specifications, $7.00.

We have also lumber bill and specifications for one 14-foot bent, which can be used if it is desired to add another bent, or shorten the barn.

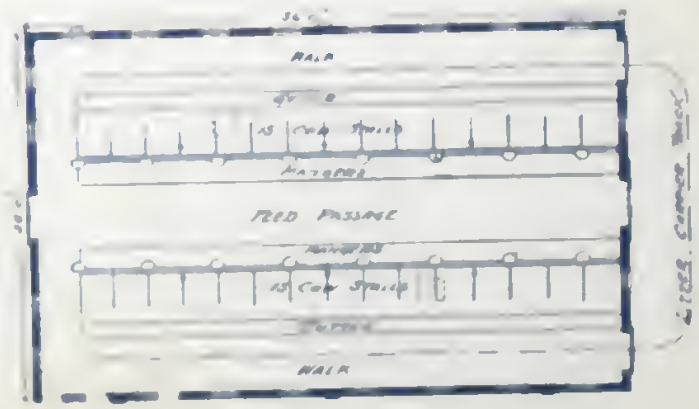


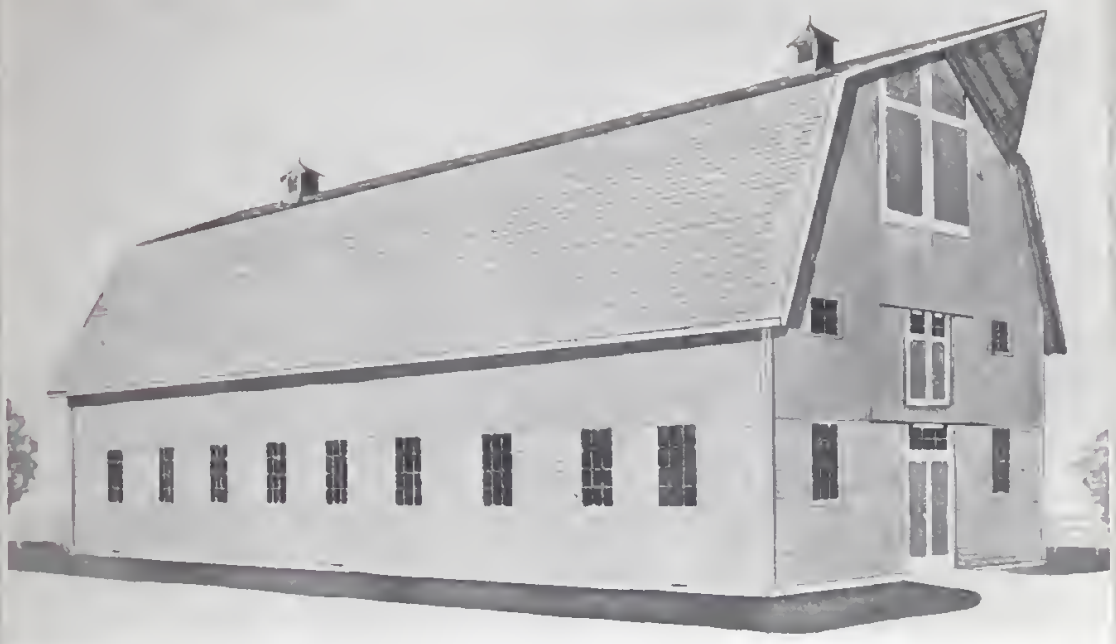
No. 10

No. 10 is a two-story barn and has storage in loft above for 50 tons of loose hay. The loft is filled from hay door in the gable. The same features of handiness and inexpensive framing apply in this case as in No. 9. The plan also lends itself to additions at any time in fact, was mainly planned on that basis, and we have made up a lumber bill and specifications for one bent so that the plan may be increased or decreased as desired.

The price of complete plans, lumber bill, and specifications is $10.00.

We can supply complete plans, etc., at same price, showing cows facing out.





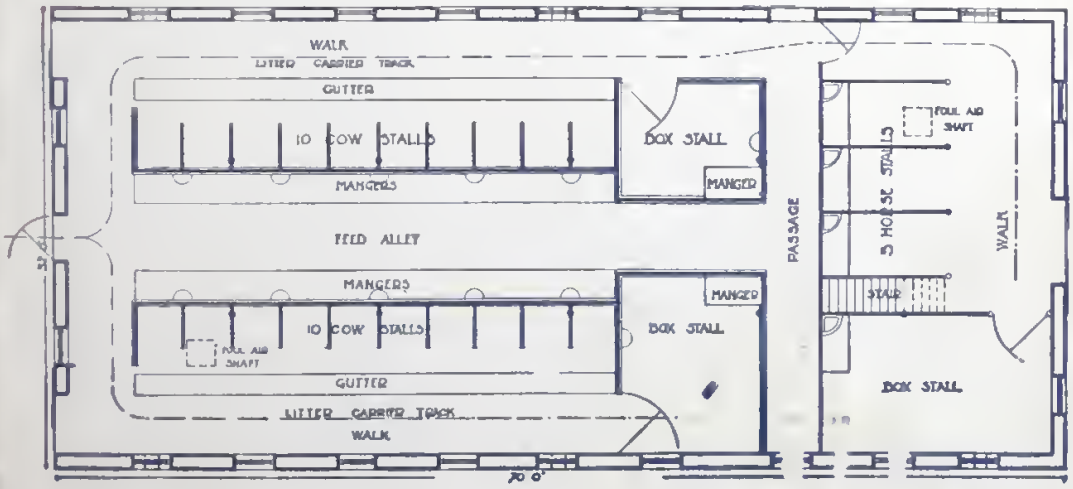
No. 8

No. 8 shows dairy barn for 20 cows, 2 box stalls, and 4 horses. This barn is 70 feet long by 32 feet wide.

The cows are separated from rest of stock by solid wall. One of the box stalls can be used for bull pen, the other as a hospital stall. The concrete foundation extends 12 inches above ground and construction above is of light plank framing.

The loft is filled by means of hay door in gable, and has capacity for 80 tons loose hay.

Price of complete plans, lumber bill and specifications is $10.50.



No. 11

No. 11 shows a splendid layout for a dairy barn for 22 cows.

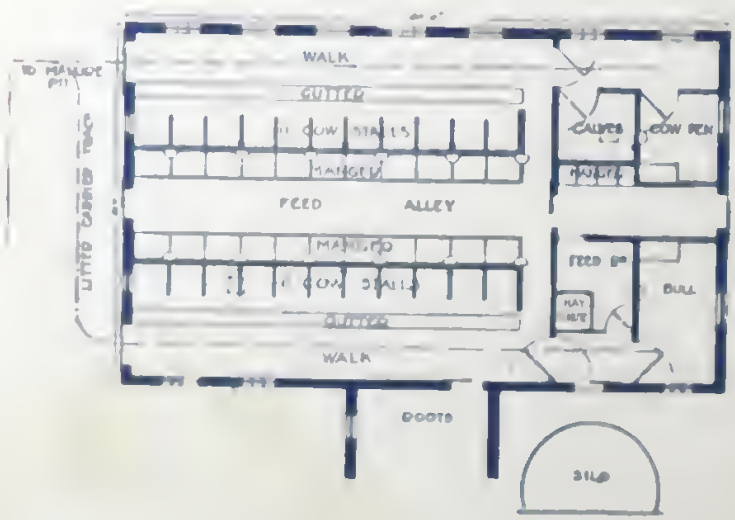
The barn is 60 feet long x 36 feet wide and has a storage in loft for 90 tons of loose hay. Concrete wall 9 feet above ground, Plank frame construction above. There is a solid wall between the cows and the other stock in the barn.

The silo is at the side of driveway with chute handy to feed from.

A manure pit occupies the space below the driveway and is handy to the feed room.

There is accommodation for 22 cows, bull, hospital and 4 calves.

Price of complete plans, lumber bill and specifications, $10.00



No. 4

No. 4 shows an ideal layout for a stock and dairy barn. In this plan the milch cows are entirely separate from the young stock, dry cows and horses.

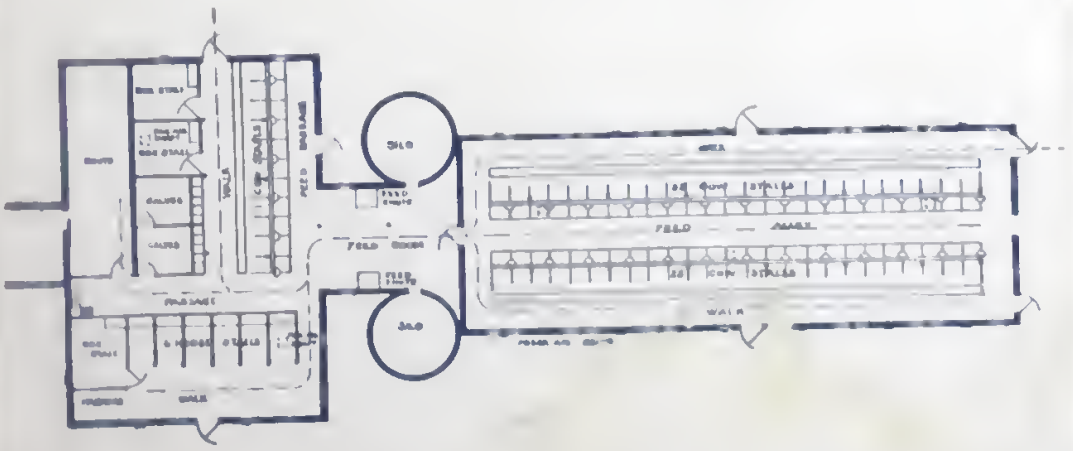
The dairy barn is one storey, all roughage being kept in the loft of the stock barn.

The stock barn is 66 feet long by 46 feet wide, and the dairy barn 100 feet long by 36 feet wide.

The concrete foundations extends to the underside of the windows, the construction above being of plank frame. There is room in the loft for 120 tons of loose hay. There is a driveway to upper floors, the space below the driveway being used for a water cistern, or may be used for a root cellar

There is accommodation for 50 cows in the dairy barn. In the stock barn there is accommodation for 7 horses, 11 young cattle, 10 calves, and two box stalls. The feed room could not be placed in a more handy positions, the feed being easily delivered to both barns.

Price for complete plans, lumber bill and specifications, $14.00.



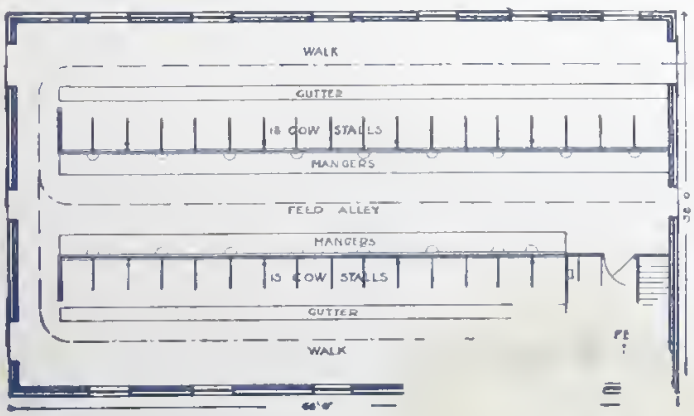
No. 12

No. 7

This plan is reproduced through the courtesy of H. A. Craig, Esq., Deputy Minister of Agriculture of Alberta. It shows a splendid layout for a dairy stable for 33 cows with feed room.

The barn is 66 feet long by 38 feet wide and has a loft capacity of 100 tons. The concrete foundation is carried up to under side of window, and on outside of concrete is lumber, making a well insulated wall. The dead air space between lumber and concrete prevents dampness on the inner walls.

Price of complete plans, lumber bill and specifications, $10.50.



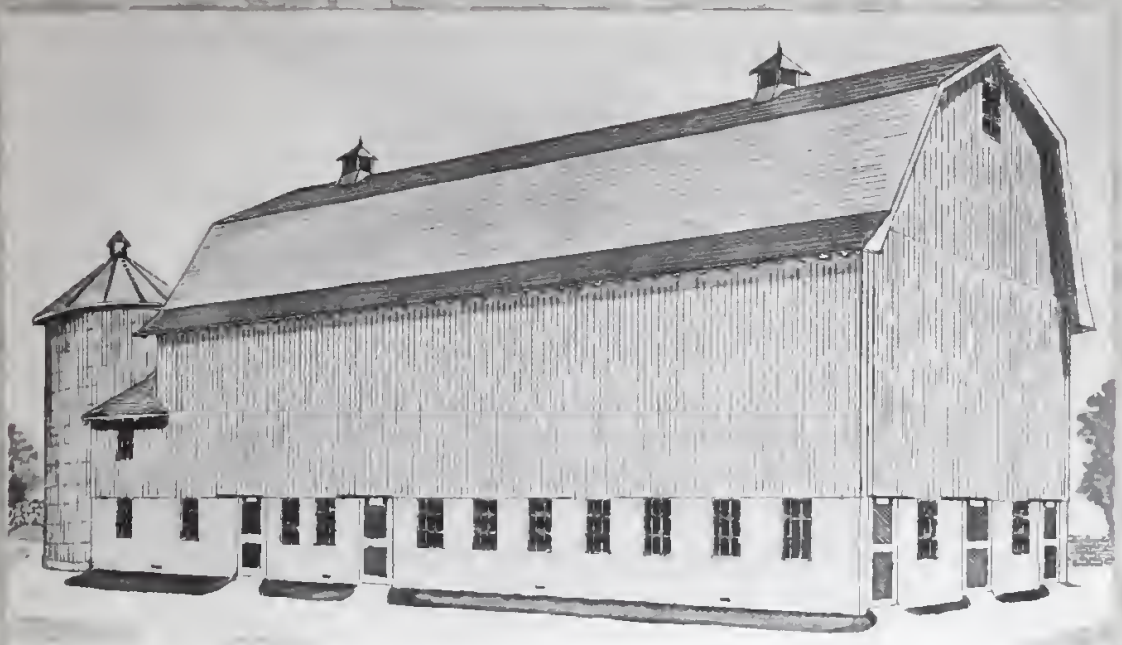
No. 15

This barn is 154 feet long by 38 feet wide, with feed room 38 feet by 16 feet and [illegible] floor plan shows accommodation for 80 milch cows. The foundation of the underside of mow is of concrete, and plank frame construction is used above. The barn is filled by means of a hay track, and has capacity for 210 tons of hay.

The [illegible] is one story high only.

The feed carrier track runs the full length of the barn, making it very handy for feeding. The manure carrier is carried down behind each row and out at the end of the barn. This can either be run to the manure pit or bracketed to the end wall, as [illegible]. Manure in this way can be dumped directly into manure spreader or sleigh.

Price of complete plans, lumber bill and specifications, $14.00

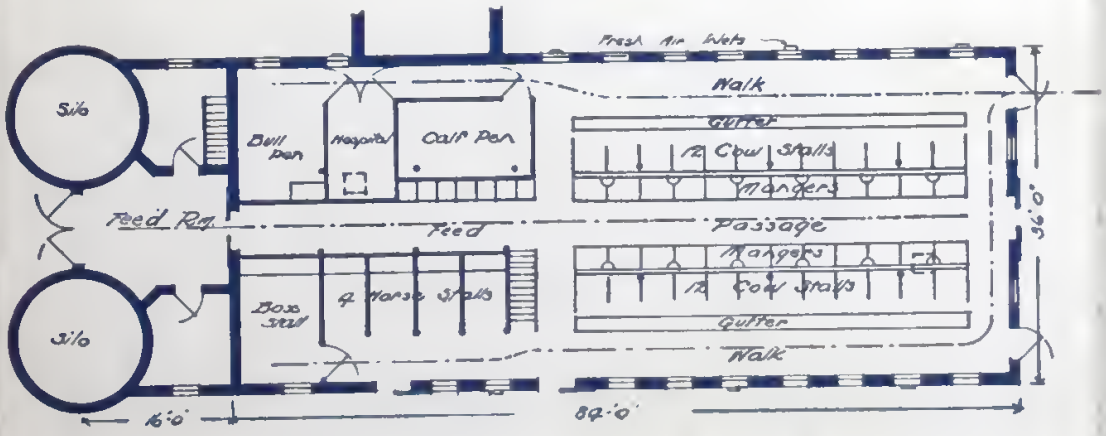


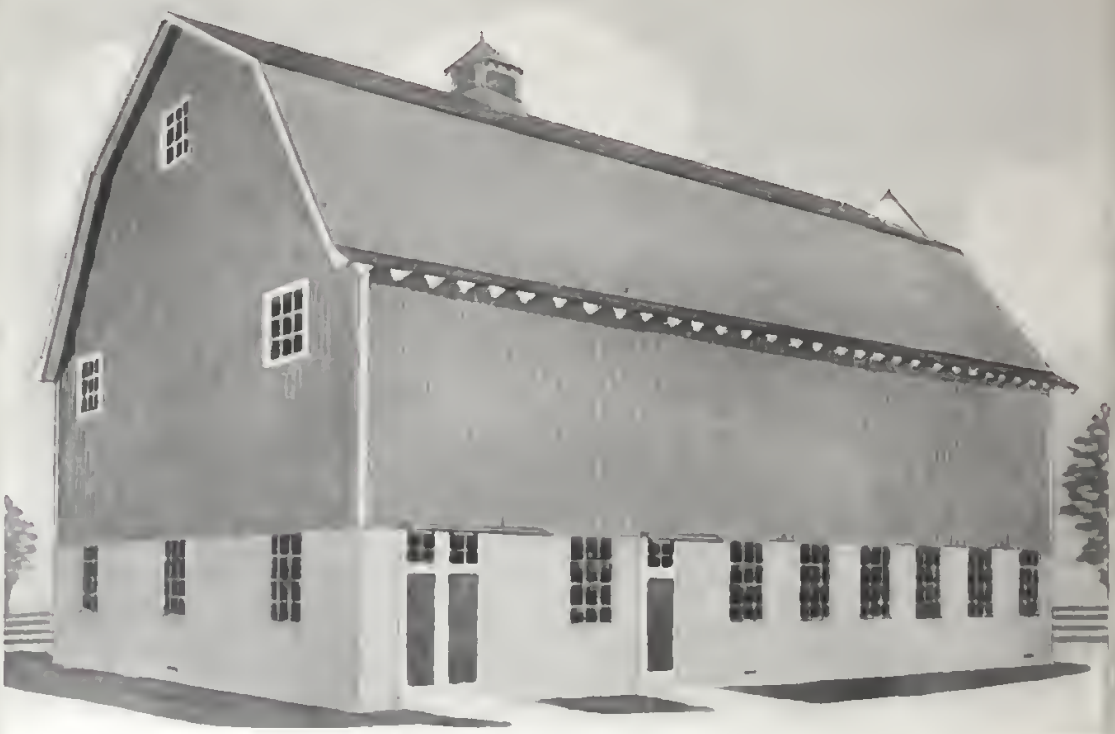
No. 1

No. 1 shows the Wisconsin model dairy barn for an 80-acre farm. This barn was originally designed by W. D. James of the James Mfg. Co., Fort Atkinson, Wis. It has accommodation for 24 cows, 7 calves, 1 bull, 1 pen for hospital, and 5 horses. This plan has many good features, such as position of feed room, making easy feeding for both cattle and horses; the ease with which this plan may be enlarged, either to accommodate more horses, or more cattle.

Concrete foundation is carried up 9 feet above ground with plank frame construction above. The loft has capacity for 170 tons loose hay.

Price of complete plan, bill of lumber and specifications, $10.50.

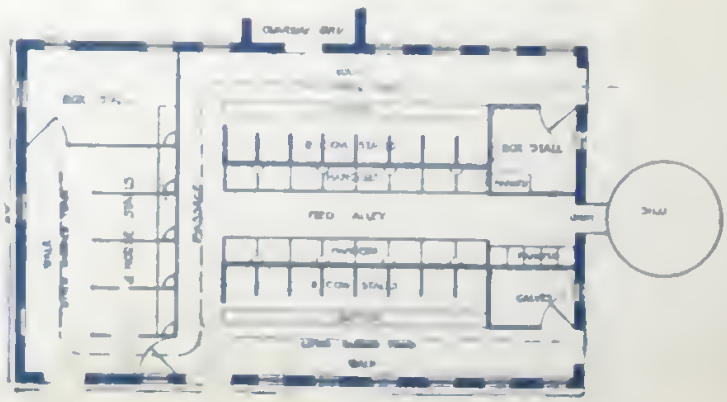




No. 16

No. 16 shows a very good plan for an ordinary sized mixed stock farm. The barn is 60 feet by 36 feet. The concrete foundation extends 9 feet above ground, the construction above being plank frame, with loft capacity of 90 tons loose hay. There is accommodation for 16 cows, bull or hospital stall, calf pen, and 5 horses. There is a driveway up into the barn. The space below the driveway is used as a root cellar. Silo for this barn is very conveniently placed for easy feeding.

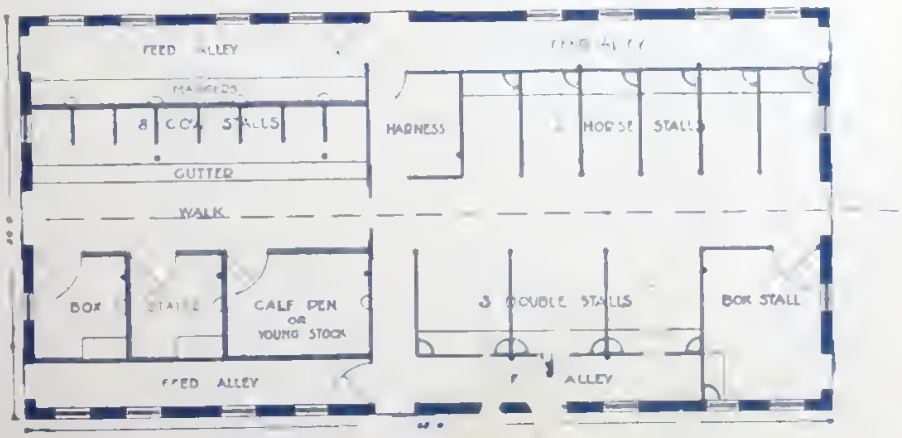
Price of complete plans, lumber bill and specifications, $10.50.



No. 17

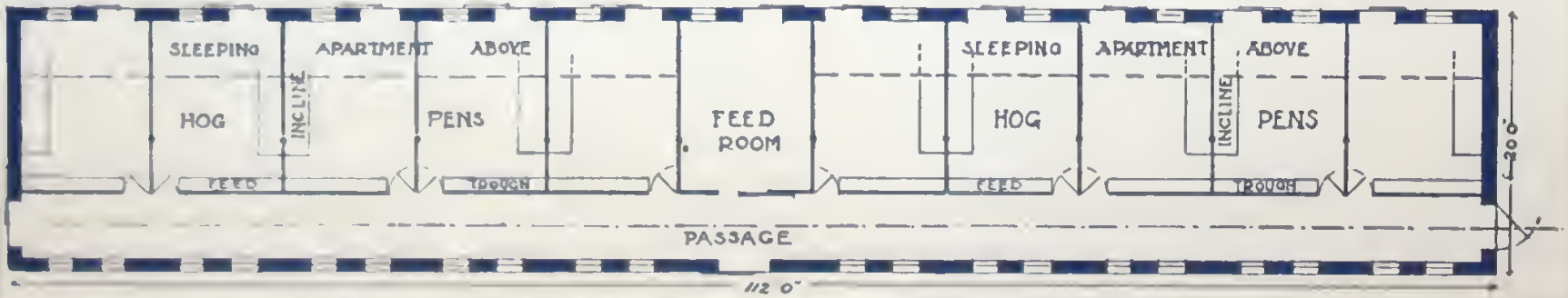
This barn is 68 feet x 34 feet. The foundation is of concrete and extends 12 inches above ground level. The posts are 14 feet long, and the construction of plank frame. This plan makes an excellent layout, especially for Western farms, giving accommodation for 13 horses, and harness room, 8 cows, with calf and bull pens. The walls in the stable are composed as per illustration on page 288, and make a very good wall for Western conditions. The barn shows an end lift, and has storage for 75 tons of loose hay.

Price, complete with plan, lumber bill and specifications, $10.50.



No. 13

No 13 shows a good layout for a hog barn; this hog barn is 112 feet long, 20 feet wide There are 10 pens each 10 by 12. The feed room in the center makes it handy to feed. Each pen is provided with a sleeping apartment, which is floored with planks and raised about 4 feet above floor line, and is reached by a gangway from each pen, this is a one storey barn Price of complete plans, lumber bill and specifications, $5 00



No. 14

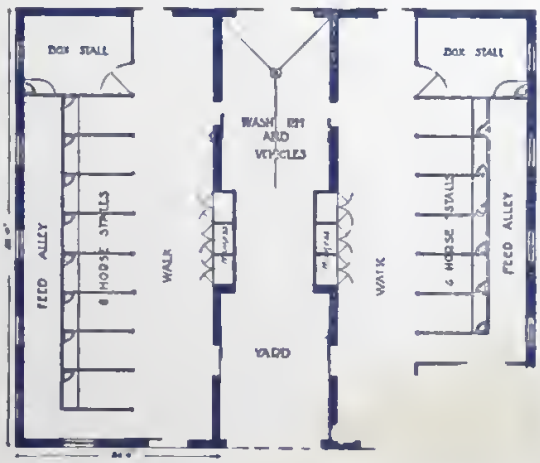
No. 14 shows a good layout for private horse stable, or the layout could be used to advantage as a livery barn.

The main arms of building are 56 feet x 26 feet with small carriage shed or wash shed 14 feet x 36 feet.

The illustration shows brick wall with concrete block corners and facings. The loft has capacity for about 90 tons of loose hay.

Price for complete plans, specifications and lumber bill, $7.00.

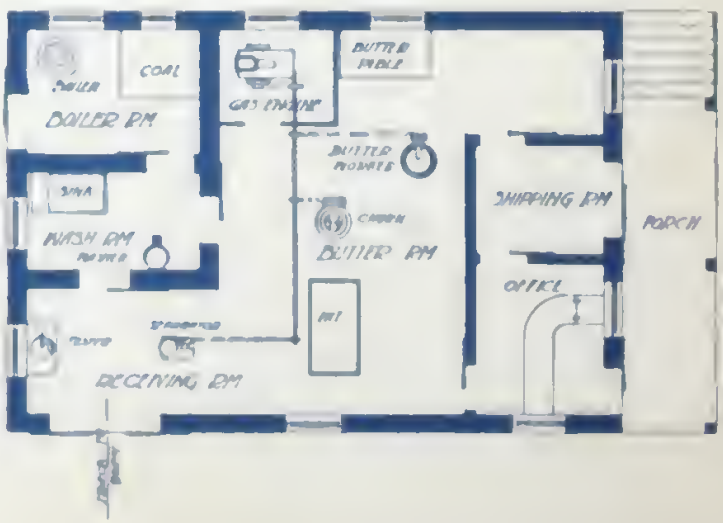
This design can be carried out to advantage with plank frame construction.



No. 12

No. 12 is a dairy in connection with any dairy stable. This building is 32 feet x 22 feet, and shows a good layout for the different utensils used. The milk is brought direct from the stable to the dairy on an overhead track.

Price with complete plans, lumber bill, and specifications, $3.50.



The B T always stands for Best.